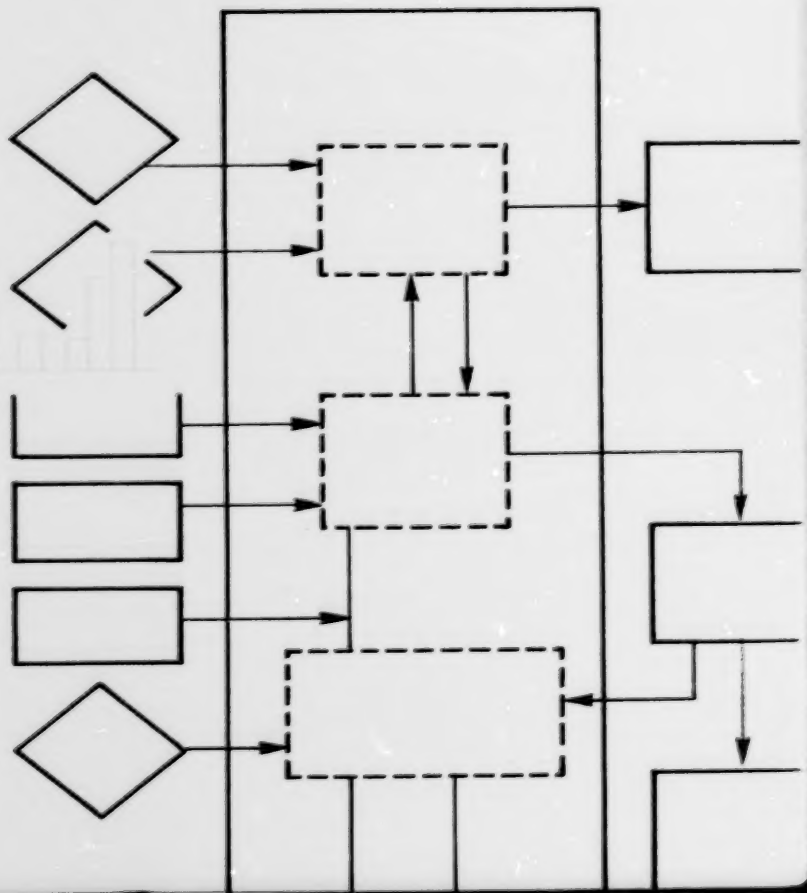
A paper prepared for the

Economic Council of Canada

Un document préparé pour le

Conseil économique du Canada



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DISCUSSION PAPER NO. 228

Practical Issues in Mortgage Finance with Applications to the Standard and Indexed Mortgages

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ISSN-0225-8013

April 1983

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RÉSUMÉ

Ce document est une étude de l'instrument hypothécaire au Canada dans le financement de l'habitation et de l'agriculture ainsi que de son évolution à travers le temps portant une attention particulière à l'interaction entre cet instrument et l'inflation. Il se concentre sur deux types d'hypothèques, l'hypothèque traditionnelle qui a été utilisée au cours des 30 à 40 dernières années pour financer l'achat d'une maison ou d'une terre agricole et l'hypothèque indexée dont l'introduction a été recommandée par le Conseil économique dans son rapport Intervention et Efficacité.

Le document commence par une description du contract hypothécaire suivi d'une discussion des risques et rendements nets (rendements bruts moins coûts) du point de vue de l'emprunteur et du prêteur. Il considère ensuite l'évolution de l'instrument hypothécaire et du marché hypothécaire canadien à travers les 30 dernières années. Sur la base de simulations ex-post utilisant des données actuelles, il est démontré que, en premier lieu, l'inflation a contribué à déplacer les coûts et les risques des emprunteurs vers les détenteurs d'hypothèques traditionnelles. Ces derniers ont réagi en modifiant certains des éléments de l'hypothèque traditionnelle de façon à déplacer les coûts et les risques vers les emprunteurs. Dans ce contexte, l'hypothèque indexée proposée est une tentative de récréer l'équilibre en regard des coûts et des risques qui existait entre prêteurs et emprunteurs dans les années 1950 et 1960, des périodes de stabilité relative de prix.

ABSTRACT

This paper is a study of the mortgage instrument in Canada as it relates to housing and farm finance and of its evolution through time with particular attention devoted to the interaction between this instrument and inflation. It focuses on two types of mortgages, the standard mortgage which has been in use over the last 30 to 40 years to finance the purchase of a home or of farmland and the indexed mortgage proposed in the 1982 Council report Intervention and Efficiency.

The paper starts with a description of the mortgage contract followed by a discussion of risks and net returns (gross returns less costs) from the borrower's and lender's point of view. The paper then considers the evolution of the mortgage instrument and of the Canadian mortgage market over the past 30 years. On the basis of ex-post simulations using actual data, it is shown that, at first, inflation contributed to shift costs and risks from borrowers onto the holders of standard mortgages. The latter reacted by modifying some of the elements of the standard mortgage so as to shift the costs and risks to the borrowers. In this context, the proposed indexed mortgage is an attempt to recreate the equilibirum with respect to costs and risks which existed between lenders and borrowers in the 1950s and 1960s, periods of relative price stability.

This is a study of the mortgage instrument in Canada and of its evolution through time, with particular attention to the interaction between this instrument and inflation.

Mortgage financing has gone through a rapid evolution in Canada over the past 30 to 40 years. No sooner had the mortgage market reached a high degree of development under the leadership of governments that inflation contributed to reduce the lenders' real return and increase the risk they were facing. They reacted by shifting costs and risks onto the borrower through modifications of the mortgage instrument. Attempts to re-establish the balance which existed between borrowers and lenders in the 1950s and 1960s with respect to risks and costs have not as yet been fully successful. The indexed mortgage recommended by the Economic Council of Canada in its latest report on financial markets, Intervention and Efficiency,[1] could contribute to the re-establishment of such an equilibrium.

Mortgages play an important role in Canadian financial markets. In the second half of the seventies, mortgage financing accounted for between 35 and 45 per cent of total financing extended and for between 52 and 60 per cent of long term financing. But in 1982, as a result of high inflation, rising interest rates and languishing real estate markets these ratios were respectively down to 13.3 per cent and 28.3 per cent. Mortgages are the main source of housing funds and play an important role in long-term farm finance. Thus, mortgages cannot be looked at exclusively

from an economic point of view as they also have an important social dimension. An active and well developed mortgage market is a prerequisite to the realization of the Canadian aspiration to homeownership and to the development of a healthy farm sector.

The paper starts with a brief description of the various elements of the mortgage contract (Section 1), and with a discussion of two important features of this contract, namely the net returns (returns net of costs) and the risks for both parties, the lender as well as the borrower (Section 2). An analysis of the evolution of the Canadian mortgage market over the last 40 years follows (Section 3), giving special consideration to the changes in the main elements of the mortgage contract and to the development of new instruments. In Section 4 we describe the new mortgage instrument proposed in the latest Council Report on financial markets and make ex-post comparisons of indexed with standard mortgage loans covering the 1974-82 period for housing and the 1961-81 period for farm finance. The comparisons are based on actual data for seven Canadian cities and on farm operations in Alberta, Saskatchewan and Ontario and illustrate the various elements of the mortgage contract and the risks and net returns involved. Finally, the paper considers the foreign experience with indexed mortgages and other innovative instruments (Section 5).

Section 1: The Mortgage Contract

A mortgage loan is a contract by which a lender advances a sum of money to a borrower who promises to discharge his debt over a predetermined period of time and pledges real property as security. The written contract stipulates the interest rate charged, the amount of the loan, the term to maturity, the amortization period and provides a legal description of the property - residential, commercial or farm - pledged as collateral to the loan. It may also include the amount of monthly payments to be made by the borrower to cover interest charges and repayment of the principal. The loan-to-value ratio, the gross debt service ratio and the amount of the owner's equity in his property are important elements for the lender and the borrower alike, although they are not included in the legal document.

The amount of the loan or the interest rate charged are familiar elements of the contract. But the difference between the amortization period and the term of the loan can be less well understood. The amortization period is used to calculate the repayments of principal included in monthly payments. It need not be equal to the actual period over which the loan has to be repaid. The term to maturity is the time at which the loan has to be fully repaid. Back in the 1950s and 1960s the term to maturity and the amortization period of NHA loans were identical. For instance, a homeowner who contracted a 25-year loan in 1961, had his loan amortized over 25 years (the amortization period) and

fully repaid at the end of those 25 years (25-year term loan). But in recent years, the term to maturity has been shortened while a long amortization period continued to be used to establish the monthly payments. For instance, mortgage loans were given in 1980 and 1981 with a one year term to maturity but monthly payments were calculated over a 20-year amortization period. These were truly one-year loans in the sense that they had to be fully repaid after one year. As there often is a large balance owing (or a "balloon payment" due) at the end of such a short term, the only way most borrowers can repay a matured short-term loan is by seeking a new loan to refinance the old one. The fact that the amortization period was 20 years and that the homeowner anticipated to be in debt for 20 years could give the misleading idea that the borrower had in fact contracted a long-term loan. Technically, the loan is for a short-term period of 1, 2, 3 or 5 years and is being continuously rolled over or refinanced with a new loan. In fact, according to the mortgage loan contract, the lender could, at the end of the term, request full payment and refuse to renew or refinance the existing loan.[2] Similarly, the borrower is not obliged to renew his loan with the original lender; he can - at some cost - substitute any other source of funds to the original loan.

The amount of the loan together with the interest rate and the amortization period determine the level of the monthly payments. Higher interest rates or a shortening of the amortization period

increase the level of monthly payments; lower rates or an increase in the amortization period have the opposite effect.

The amount of the loan expressed as a proportion of the property value pledged as collateral, namely the house, the building, or the farm land, is the loan-to-value ratio (LTV). This ratio also indicates the equity which an owner has in his home or farm.

Finally, another important variable in the mortgage loan transaction is the gross debt service ratio (GDS). It is the ratio of the monthly payment to the before-tax income of the borrower. The GDS increases as monthly payments rise and income declines, and vice-versa. Therefore, an increase in the interest rate charged or a shortening of the amortization period will increase the gross debt service ratio.

Section 2: Returns and Risks

2.1 The Returns

To the lender, the return may come in two basic forms, a cash interest payment or an appreciation in the value of the asset he holds, otherwise known as a capital gain. Traditionally, it is considered that the return to a mortgage loan takes the form of cash interest payments. However, as will be seen later, part of the return may also be in the form of capital gains under certain forms of mortgages. It should be noted that the lenders incur many transaction costs linked to the issuing of mortgage loans - costs of credit evaluation, of registration of the loan and of evaluating the various parameters of the loan. These may be higher the less conventional the loan and the more difficult the appraisal of the borrower. Thus when the lender considers his return, he looks at a net figure, gross return minus costs.

To the borrower, the interest paid and any eventual increase in the balance of the loan are borrowing costs. To a farmer or businessman, the benefit of contracting a mortgage loan is the income he can derive from the office he purchased, the plant he built or the farm land he acquired. For a homeowner, the services of his home and the benefit from homeownership represented by the equity in his house provide non pecuniary returns as well as a saving of alternative rent payments.

2.2 The Risks

Both lenders and borrowers assume risks. These are the risk of loss by default, portfolio risk and interest rate risk.

2.2.1 From the Lender's Point of View

2.2.1.1 The Risk of Loss by Default

To incur a loss by default, a lender must experience not only a default but also an inability to recover all his costs through the disposal of the property pledged as collateral. Thus, the risk of loss by default could be viewed as the product of two factors: the risk of default and the probability of recovering the funds loaned. The former is the risk that the borrower will default on his payments. The latter is the probability that in case of default, the collateral pledged may be insufficient to allow the lender to recover all his losses. We will consider these two factors successively.

2.2.1.2 The Risk of Default

Two elements of the mortgage contract contribute to the risk of default, the GDS and the LTV. The GDS is a proxy for the burden of the mortgage loan on the owner's income. The higher this ratio, the higher the burden and the more difficulty will the

borrower have in meeting his mortgage liability. In the industry, it is generally considered that the GDS of homeowners should not rise above 25 or 30 per cent depending on whether the payments include property taxes and other operating costs of the home such as heating, and whether the lender also considers the spouse's income. The GDS, as we have seen depends on the level of monthly payments and on the borrower's income. Four elements of the loan transaction have a direct impact on the monthly payments and thus on the GDS. A higher loan amount, a higher interest rate and a shorter amortization period increase the level of monthly payments and therefore will, other things equal, raise the GDS. A shorter term to maturity may imply more frequent refinancing of the loan at varying conditions, particularly with respect to interest rates and amortization period and may thus lead to a different and possibly increased GDS. Thus, a larger loan amount, an increase in interest rates and a reduction of the amortization period increase the risk of default by raising the GDS. A short term to maturity - 1, 2, 3 or 5 years - is also risky since the GDS may rise on renewal.

A second factor which may affect the risk of default is the amount of the borrower's equity. Initially, the amount of equity is determined solely by the LTV. But as time goes on, the equity also depends on fluctuations in the market value of the property and on the amortization of the principal amount of the loan.

It is often considered in the mortgage lending industry that the less equity a borrower has in his home or farm, the higher the risk of default. Lenders particularly fear situations of negative equity where the balance of the loan outstanding exceeds the value of the property pledged as collateral. But will in fact an owner with negative equity abandon his property?

Firstly, the borrower may not be aware of the situation until he puts his house or farm up for sale or a neighbour with a similar property does so. It may therefore take a few months until the borrower realizes that he no longer has equity in the property. Even then, the borrower will not immediately turn in his keys, since he would not be able to buy another property and would increase his loss by moving expenses that range between 2 to 4 per cent of the value of the home. A farmer can be in a similar situation. Abandonment of his farm means giving up his livelihood or incurring the costs of finding another farm suitable for the same kind of production. Both are strong disincentives to abandon the property for the only reason that equity turned negative. Furthermore, the default will make it more difficult and more expensive in future to negotiate new loans for the purchase of a new residence or farm, or for any other purpose.

The borrower will also consider that by law he can be sued by the lender for the loss incurred after disposal of the property

pledged as collateral. Financial institutions have occasionally made use of this right. While lenders will not take to court borrowers who are in default because of their difficult personal economic and financial position, they have in the past taken action against borrowers who have abandoned their house or farm while having an adequate source of income or other unencumbered assets. There is thus a strong disincentive for the borrower to default just because he has negative equity in his property.

On the other hand, if a borrower is struggling to meet his mortgage payments, if he had to miss several of them, negative equity is a further incentive to default. Basically, default depends on the levels of both the GDS and equity. Negative equity by itself is unlikely to trigger default if the GDS is relatively low. This is even more so as Canadians have a distaste for default. Moreover, a house or farm can have sentimental value when occupied by the owner - thus making abandonment an even more traumatic experience.[3]

2.2.1.3 The Probability of Recovery

Default is a necessary but not a sufficient condition for the lender to incur a loss. The lender will incur a loss only if the proceeds from disposal of the collateral are insufficient to extinguish the debt and to cover the costs associated with the default (e.g., notary and legal fees, taxes, etc.).

The main factor determining the recoverable amount is the equity of the owner in his property. A large equity means that the lender has a comfortable cushion against fluctuations in the market value of the property and will be able to recover the other costs associated with an eventual default. It is estimated that for a lender to be able to recover the balance owing and associated costs, equity should at least be 10 to 15 per cent of the market value of the property. Some even consider this to be a low ratio. The Bank Act, the Canadian and British Insurance Companies Act and the Trust Companies Act do not allow institutions falling under their jurisdiction to make uninsured mortgage loans in excess of 75 per cent of a property's market value. The legislators must have considered that 25 per cent equity constitutes a minimum cushion.

Equity in the property thus enters twice in the evaluation of the risk of loss by default. Low or negative equity leads to default if the GDS also happens to be unbearably high but low equity need not be the direct cause of default. It is, however, the principal cause of loss by default.

2.2.1.4 The Behaviour of Financial Institutions with Respect to the Risk of Loss by Default

Given the rate of interest, rational behaviour would dictate that lenders minimize the risk of loss by default. In practice, however, private lenders may instead minimize the risk of default,

which is only part of the risk of loss by default. Actual operations of bank or trust company branches and the criteria used to evaluate the performance of a loan officer or branch manager suggest that the emphasis is on minimizing the risk of default rather than the risk of loss by default. Many managers feel that, independently of the amount of financial loss they register, a high default rate is not well perceived within the organization.[4] It may be that it is more costly to administer a portfolio with a high default rate because of all the administrative procedures triggered by defaults. But the disposal of collateral should cover these costs.

If the emphasis is placed on minimizing the risk of default, the main element considered in the lending decision is the GDS. A borrower with a high GDS - even if he has a lot of equity in his property - will not be considered on the same footing as a borrower with a lower GDS but less equity.

2.2.1.5 The Portfolio Risk

Portfolio risk refers to the risk inherent in a large number of loans outstanding, as opposed to the risk inherent in each loan considered individually. The risk of the portfolio can be equal to, greater, or less than the sum of risks assumed with each individual loan. Lenders seek to reduce portfolio risk by lending on different kinds of property and in different areas so that

financial troubles of a local nature or related to specific types of property will not bear too heavily on their entire loan business.

Another aspect of portfolio risk results from a mismatch between assets and liabilities. For instance, if mortgage lenders were to fund long-term mortgages with short- or medium-term deposits they would run the risk of having to honour their liabilities without being able to fully realize their assets. An important mismatch between the terms of liabilities and assets could bring a lender to the brink of bankruptcy.

2.2.1.6 Interest Rate Risk

Interest rate risk is the risk that the lender may lock himself into a long-term loan at a rate providing him a return well under what he could have earned with a series of consecutive short-term loans or vice versa. The interest risk is reduced by shortening the term of the contract.

2.2.1.7 The Lender's Options

The various risks depend on the elements of the loan contract described in Section 1 and can be altered by modifying them. There are many trade-offs in doing so, trade-offs between returns and risks and between various categories of risks.

The objective of the lender is to achieve his preferred risk-return combination. If a loan is more risky, he may incorporate a higher risk premium in the interest rate charged. But this will increase the borrower's monthly payments and GDS, thus causing some further increase in the overall riskiness of the loan. An alternative is to reduce the amount of the loan, which would reduce the GDS and the loan-to-value ratio and would therefore also decrease the overall risk of loss by default. But if the amount offered is insufficient to meet his needs, the borrower may turn down the conditions offered by the lender and the loan transaction may not materialize. To reduce his portfolio and interest risks, the lender may shorten the term of the loan, but in doing so he shifts those risks to the borrower. This may increase the risk of default as the borrower may be faced with a much higher GDS at the time of renewal.

The lender can thus modify the risk-return characteristics of the loan by modifying the various elements of the contract after evaluating the types of risk that can be increased and those that have to be reduced to result in the optimal risk-return combination. Moreover, a lender will not look at a loan in isolation from the other assets he holds. He will consider the overall risk and return of his portfolio. He may accept a higher risk on a specific loan contract if he has less risky loans in his

portfolio or if this loan, despite its high individual risk, contributes to reduce the overall risk of its portfolio.

2.2.2 From the Borrower's Point of View

2.2.2.1 The Risk of Default

Default is a risk not only for the lender but for the borrower as well. Financially, default may be costly if the borrower has positive equity in his property, has other unencumbered assets that can be claimed by the creditor, or has sufficient income to extinguish his debt. It may also be costly in terms of a tarnished credit rating.

2.2.2.2 The Interest Rate Risk

The interest rate risk faced by the borrower is similar but not exactly symmetric to the one faced by the lender. Firstly, there is the risk that the borrower has entered into a long-term contract where the interest rate is fixed for the duration of the loan agreement. Should interest rates fall, the borrower may find himself paying more interest than if he had had short-term loans. This risk was reduced by legislation that allows the borrower to reopen the loan contract after a 5-year period. Secondly, a borrower taking a short-term loan risks that interest rates will be higher in future in which case he might have been better off

with a longer term loan, even if it was at a higher rate of interest than his short-term loan.

2.2.2.3 Portfolio Risks

The borrower is also faced with a portfolio risk if his asset is not financed by an instrument of similar maturity. Long-term assets like a house or farm land should be financed with long-term funds like equity or long-term loans. Short-term financing may under unfavourable circumstances oblige the borrower to dispose of the asset at a loss. In less extreme cases, the borrower may retain the asset and his equity in it but at a much higher carrying cost. To reduce this risk, the borrower should attempt to obtain a long-term loan.

When a borrower has to renew a short-term mortgage at signficantly higher rates he can reduce his monthly payments by reducing the loan amount but this may mean revising his aspiration with respect to the kind of home or kind of farm he can afford. He may also lengthen the amortization period of the loan but this is of limited use if interest rates are high and the amortization period is long to begin with.

2.2.2.4 The Borrower's Options

The borrower may try to modify the various elements of the loan to reduce risks and increase the net return (pecuniary and non pecuniary returns less costs). For instance, he may choose a longer amortization period but this will slow down the rate of growth of equity in the home. He may attempt to negotiate a lower rate but this is generally not possible for individual borrowers since rates are determined in the market place and are in relation to the returns on other assets. To reduce the burden of mortgage payments and risks, he may increase his down-payment. A larger down-payment will reduce the risk of default by reducing the GDS and by increasing the equity in the home. But for many, particularly the young who have very little cash on hand, this may limit accessibility to homeownership. To reduce his interest risk he may attempt to change the term of the loan. But he may often be unable to extend the term without agreeing to a higher nominal interest rate which increases the real burden of the loan and may make it unaffordable.

2.3 Conclusion

The various elements of the loan contract have direct impacts on the returns and risks to lenders and borrowers. By changing these elements, lenders and borrowers can modify the risk-return characteristics of loans. But changes in any one of the elements

may reduce some risks and increase others. Moreover, the interests of the borrower and the lender may diverge. An equilibrium has to be reached between the various categories of risks and returns and between the borrower's and lender's positions.

Section 3: The Evolution of Mortgages and of the Canadian Mortgage Market Over the Last 30 Years

In the 1950s, houses, commercial buildings and farms were financed by loans with a term of 25-years or more amortized over the same period of time and bearing a nominal interest rate fixed for the duration of the loan, which we now refer to as the (long-term) standard mortgage. In the case of a loan extended to finance the purchase of a home, monthly payments blended interest charges with repayment of part of the principal and property taxes. NHA insurance greatly contributed to the introduction of the long-term mortgage. Since 1954, federal insurance under the National Housing Act made it possible to obtain new homes on these attractive terms. This insurance was later extended to existing homes. In the agricultural sector, mortgages of this sort were generally extended by public lenders as the private sector stayed away from long-term farm lending.

Over the following thirty years three major changes took place in the Canadian mortgage market. Private sector lenders greatly increased their participation, the various elements of the standard mortgage were modified and new forms of mortgages were introduced.

Intervention and Efficiency documented the increased role played by private financial institutions in mortgage lending, particu-

larly following the 1967 changes to the Bank Act which fully opened the mortgage market to Canada's chartered banks.[5] In housing finance, loans granted by private financial institutions financed almost one-half of the total expenditures on new housing towards the end of the 1970s, up from one-third in the mid-1950s. With respect to existing houses, private lenders held almost 90 per cent of institutional mortgage loans outstanding in 1980. By comparison, in 1954 they held 75 per cent of all mortgages. In 1980, financial institutions held 28.5 per cent of long-term farm credit outstanding, compared to 2.9 per cent in 1961.

All elements of mortgage loans were modified. Following a period of relative stability in the 1950s and early 1960s, the mortgage rate fluctuated along a rising trend (Chart 1). It reached a peak of 21½ per cent in September 1982, about three times higher than its level in the 1950s.

Over the same period, the term to maturity of the standard mortgage was considerably shortened. While NHA loans used to run for 25 years, the average term to maturity of conventional loans extended by financial institutions in 1961 was around 10 years (Table 1). Over the 1970s NHA loans with a maturity longer than 5 years became rare and disappeared completely in 1979 (Table 2). From 1979 to 1981, the proportion of NHA mortgage loans of less than 5-year term increased from 14.9 per cent to 42.5 per cent. Likewise, the terms to maturity of conventional loans were also

reduced. Many NHA and conventional loans were extended with a 1 or 2 year term and even a six month term. Some short-term housing loans are no longer registered at land-titles offices but are less well-secured personal loans.

No definite pattern appears with respect to the amortization period. During the 1970s, as interest rates rose, the amortization period also increased. This might have resulted from attempts to reduce the burden of monthly payments, but amortization periods have been trending down since 1977. As indicated in Intervention and Efficiency, there is a limit to the relief given by extending an already long amortization period when interest rates are high. A longer amortization also slows down the build-up of equity. The combination of these two factors may have changed the trend in the amortization period.

The loan-to-value ratio increased particularly toward the end of the 1970s and in the early 1980s. During the 1950s and 1960s this ratio hovered around 80 per cent for CMHC and NHA-insured loans (Table 3). In the late 70s and early 80s it was about 90 per cent. A similar picture emerged from an analysis of conventional mortgage loans for new housing. These were made with a ratio around 40 to 45 per cent in the 1950s and 1960s compared to 65 to 75 per cent in the 1970s.

The GDS also increased over the past 30 years. As can be seen in Table 4, it rose slowly over the 1950s and 1960s. It stabilized somewhat between 1968-73 to move along a rising trend thereafter. For borrowers whose income measured in 1954 dollars would qualify as average, the GDS increased from 23.6 per cent in 1971 to 34.1 per cent in 1977. Although more recent data are not available, cyclical developments in the late 1970s and early 1980s have probably accentuated this increase in the GDS.

Parallel to the sharp rise in interest rates, the reduction in the term to maturity and the increase in the loan-to-value ratio, new instruments appeared on the market in the late 1970s. One of the most recent innovations is the variable rate mortgage loan (VRM). The actual terms vary from one lender to another. Under one plan, the rate of interest was set at the beginning of each month and guaranteed not to exceed a certain fluctuating reference rate. The loan was of 5-year term with 25-year amortization. It required 30 per cent equity and was subject to re-evaluation if the homeowner's equity fell below 30 per cent during its term. Adjustments of monthly payments to varying interest rates are not made periodically but when the term runs out. This means that the balance outstanding increases, and equity can be reduced, if the mortgage rate rises continuously over the five-year term. In 1978, CMHC began insuring graduated payment mortgages (GPMs) by which interest payments due in the first five years are in part deferred to future years. The amount deferred is added to the

principal outstanding, to be amortized and paid off with interest in future years. This was to provide relief from rising GDS's.

Monthly payments on NHA insured GPM loans begin at a level which is at most $2.25 per $1,000 of loan less than the payment on a comparable fixed payment mortgage. The GPM payments increase by 5 per cent per year until they reach a level that can be maintained for the rest of the amortization period (if in the meantime interest rates do not change on refinancing). This final level of the monthly payment is higher than on a comparable standard loan. The difference is to pay off with interest the initial reduction in monthly payments, since this shortfall is added to the balance outstanding. This balance can rise for about six years and can take eleven years to fall back to the level of the original amount of the loan. Graduated payment schemes are available also as a feature of variable rate loans. The GPM has, however, two disadvantages.

Firstly, the initial cash-flow relief is insignificant when the mortgage interest rate is very high. Low-interest vendor take-backs and interest buy-downs allowed purchasers to make much lower initial monthly payments than those required at current GPM interest rates. In the case of the low-rate mortgage back to vendor, the cost of the reduction of initial mortgage payments could be added to the price of the house and the amount of the loan. In the case of a buy-down, the vendor paid the lender up-

front for reducing the mortgage rate, and could have added this cost to his asking price. In both cases, the purchaser's monthly payments could be reduced by much more than $2.25 per $1,000 and, consequently, this lending technique was more successful than the GPM. Vendor take-backs and buy-downs were especially important in 1981 and 1982.

The second disadvantage of the GPM - which is also a disadvantage of take-backs and buy-downs - is that monthly payments and the balloon payment due on maturity depend on expected and not on actual inflation and their attractiveness depends therefore on the certainty with which inflationary expectations can be held. Monthly payments and the debt rise inexorably regardless of the actual rate of inflation and changing market conditions. This contrasts sharply with the alternative discussed later in this paper, where monthly payments depend on actual inflation and the success of financial plans is less dependent on the realization of inflationary expectations.

There are also other ways of adjusting the weight given to actual and expected price-level changes, some of which have become common in commercial mortgage lending during the late 1970s. Participating mortgage loans to finance a shopping centre or office building, for example, can be arranged at comparatively low long-term rates fixed for 10 or more years on condition that the borrower pay - in addition to this low interest - a share of

either his gross rent, or his net rent, or his net cash-flow after mortgage interest, or of the appraised increase in the value of the property. Such a participating mortgage can be considered a special case of loan indexation in which the choice of index gives the loan some of the characteristics of an equity investment. Other instruments are still at the proposal stage as is the case with the indexed mortgage recommended by the Economic Council of Canada.

To sum up, following a period of relative stability in the 1950s and early 1960s, the various characteristics of the standard mortgage underwent considerable change. The interest rate soared, the term to maturity was cut short, the initial loan-to-value ratio increased, and the gross debt service ratio rose. Moreover, new instruments appeared in the late 1970s and early 1980s. These changes resulted from attempts on the part of borrowers and lenders to adjust to changes in risks and returns caused by rising levels of inflation in the late 1960s and throughout the 1970s. The effect of inflation on the standard mortgage changed the relative positions of borrowers and investors, the returns and the risks they faced.

In a period of price stability, and when various economic agents do not anticipate a high rate of inflation, lenders act cautiously since the accumulation of equity in a home is a very slow process and the GDS remains relatively stable over the years.

Since the GDS does not fall by very much during a period of price stability, it should be set at an affordable level so as to minimize the risk of default. Accordingly, it was around 15 per cent in the 1950s and 20 per cent in the 1960s.

Equity in the borrower's property depends on the fluctuation in house prices, particularly in the early years of the loan as most of the monthly payment represents interest charges and very little constitutes repayment of principal. During a period of relative price stability, house prices fluctuate along a flat or slowly rising trend. House prices can also fall in certain areas or fail to keep up with the general price level. This was actually the case in the 1950s and early 1960s. Between 1957 and 1962, the average multiple listing price rose at a slower pace than the Consumer Price Index (CPI). It even declined absolutely in 1960. The fluctuations of house prices in particular neighbourhoods were probably more pronounced. In such a situation, lenders have to watch the level of the owner's equity to avoid default. This is why loan-to-value ratios were generally less than 75 per cent.

Inflation changed all that. Firstly, mortgage lenders suffered losses on outstanding long-term loans made at interest rates below the inflation rate. As inflation accelerated and interest rates became more volatile, it became increasingly difficult for lenders and borrowers to forecast the future course of interest rates and therefore to set a rate which could be fixed for the duration of

20 or 25 years. If such a rate could have been set, it would certainly have had to be well above current market rates with a premium large enough to cover higher inflation and interest rates in the future. It is quite likely that borrowers would have refused loans at such high rates. Secondly, inflation sharply contributed to increase the lenders' portfolio risk. Indeed, with increased inflation and increasingly volatile interest rates, savers opted for short-term investments. It became more and more difficult for lenders to attract long-term funds to finance long-term mortgages. An imbalance was therefore created between the long-term nature of a lender's mortgage assets and the short-term nature of his deposit liabilities. On the other hand, inflation contributed to reduce the risk of loss by default. Indeed, standard monthly payments are fixed in dollar or nominal terms for the life of the loan. In terms of their purchasing power the real payments are progressively reduced by inflation. Moreover, inflation increases over the long-term the borrower's nominal income. As a result, the GDS declines very rapidly. This is well illustrated by our simulations of a standard mortgage in an inflationary environment which show a fast drop in GDS over the five years beginning in April, 1974 from 30 per cent to only 17 per cent (see Appendix). Inflation also accelerates equity accumulation by pushing up the prices of houses. In some cities (like Regina or Halifax) the equity in a house purchased in 1974 could have increased from 15 to 50 per cent in only 7 years.

In many cities, homeownership became somewhat less accessible because at times house prices rose faster than incomes. The coming of age of the post-war baby boom and sociological changes producing a larger number of single households are related to this faster rise in house prices. And in the circumstances, individuals were indeed willing to devote a larger part of their income to housing expenditures. With the added competition provided by the entrance of banks in this field, lenders quickly adapted to the new situation.

First, they made loans with higher GDS. A GDS of 30 per cent was not uncommon during the 1970s. Secondly, they reduced their down-payment requirements. Insured loans were made for up to 90 and even 95 per cent of the market value of the property pledged as collateral. In doing so, lenders initially increased considerably the risk of loss by default. However both lenders and borrowers could have been counting on continued inflation to quickly reduce the GDS and increase equity, thus reducing the risk of loss by default.

Secondly, to reduce interest and portfolio risks, lenders sharply shortened the term to maturity of new loans from 10 years and more in the 1960s to 5 years in the early 70s and to 1 year or even only 6 months term in the late 1970s. By doing so, they somewhat increased their risk of loss by default since, if the interest rate should be much higher and the borrower's equity low

or even negative at the time of loan renewal, it is possible that the borrower would prefer default to renewal. This increased default risk must however have seemed unimportant while inflation was believed to continue. Lenders also shifted the interest rate and portfolio risks on to the borrower. Indeed, it is very difficult for the borrower to know at what interest rate he may have to renew a mortgage loan. The borrower's portfolio risk is increased because he is financing a long-term asset with a short-term loan. At the time when it occurred, borrowers may not have viewed this reassignment of risks as a disadvantage to them. They may have preferred short-term borrowing if they believed inflation and high interest rates to be temporary and expected rates to fall soon. However, inflation was not temporary but has now lasted for about fifteen years. Furthermore, when interest rates fall, as they sometimes do, borrowers cannot obtain long-term loans to get permanent advantage from temporarily low interest rates.

Finally, mortgage interest rates were adapted to inflation by adding to an inflation free or real rate of interest a premium for <u>expected</u> inflation. One function of this premium is the preservation of the purchasing power of the lender's capital. Its payment by the borrower is of the nature of an amortization payment and reflects the fact that the unusually fast equity accumulation made during inflationary times is paid for with higher monthly payments, which can be a source of cash-flow problems.[6]

There have been attempts by borrowers and lenders alike to try to come back to the balance which prevailed 20 years ago when inflation was almost non-existent by today's standards and when equity accumulation proceeded at a slower and less burdensome pace. We have seen the variable rate graduated payment mortgage, vendor take-backs, and in the United States, proposals of shared appreciation mortgages. The indexed mortgage recommended by the Economic Council of Canada in its November 1982 report Intervention and Efficiency is an attempt to reproduce, as closely as is possible in times of changing price levels and interest rates, the financial characteristics of long-term fixed-rate loans, their risk characteristics, and their slower pattern of equity accumulation.

Section 4: The Indexed Mortgage

Following a brief description of the indexed mortgage, this section will dwell on a comparison between the indexed and the standard mortgage in an inflationary environment. It will also briefly compare the indexed mortgage to other mortgages introduced or proposed in recent years. It will present simulation results for indexed mortgage financing of a home and of a farm. Finally, it will discuss the choice of indexation factors.

4.1 The Indexed Mortgage

Inflation and, more generally, price level changes, are important factors determining interest rates. At present, the mortgage interest rate is adjusted to expected inflation. This is the case both of standard loans and unconventional ones such as the GPM and a VRM linked to market rates of interest.

Another way of adjusting the mortgage contract to inflation is to link the interest rate to actual inflation. The link to actual instead of expected inflation constitutes the difference between indexed and standard loans. Linkage to actual inflation eliminates a large part of interest rate risk and, in so doing, facilitates long-term lending. Interest rate risk is reduced by indexation because expected inflation and the corresponding

interest expectations no longer have a role to play in indexed lending.

In the case of an indexed mortgage loan, both parties agree on an inflation-free, real rate of interest that they can fix for the life of a long-term loan. Adjustment to inflation can be made in basically two ways. One is to periodically revise the loan payment setting it at the rate corresponding to the agreed real interest plus the rate of inflation observed since the last adjustment. This is a mechanism similar to that used for VRMs, with the difference that existing VRMs are linked to market rates of interest and through them to expected inflation, whereas the indexed loan payments would be linked to observed inflation. Indexed payments can be adjusted monthly to the inflation observed during a previous month, just as VRMs can be adjusted monthly to changing rates for short-term loans.

The second way of adjusting loans to actual inflation is to index the principal balance outstanding. Loan payments would in this case be a fraction of the indexed balance, the fraction being determined by the initial real rate and the remaining term to maturity. Monthly payments increase (or decrease) as the fixed real rate is applied to an increased (or decreased) balance outstanding. Such a contract recreates the financial conditions which would have prevailed in a period of price stability. The present value of monthly payments over the life of the loan can be

the same for an indexed mortgage as for a standard mortgage. The stream of payments however, differs at each moment in the life of the loan. In real terms, the monthly payments on a standard mortgage decline over the years while the monthly payments on an indexed mortgage reproduce the situation which would have existed in a stable price environment.

An example will illustrate. Assume that an individual receives a $40,000 loan bearing 2 per cent interest for a term of 25 years. The annual payment on this loan in the first year would be $2,049 of which $800 represent interest charges and $1,249 represent repayment of the principal. The balance owing after the first year is thus $38,751. If inflation turns out to be 10 per cent, the balance will be increased by 10 per cent to $42,626 or by an amount of $3,875. It is as if the lender had granted the borrower a new loan for an amount of $3,875. This new loan carries 2 per cent interest but with an amortization period of 24 years. The same process then starts all over again. Every year, there is a "new loan" in the amount created by indexation and bearing a 2 per cent rate but with a term to maturity such that it will be extinguished at the same time as the initial $40,000 loan. This example illustrates why the monthly payments increase over the life of the loan and why they always increase by a percentage equal to the indexation factor. This example explains also why the balance owing can increase during the initial years of the life of the loan but decreases thereafter. The repayment of all

these successive loans at one point in time eventually becomes more important than the new loans granted. The point at which this happens depends of course on the factor of indexation, on the interest rate and on the amortization period.

This method of adjustment to actual inflation differs from the first (adjusting the monthly payments) in its effects on the dollar amount of the balance outstanding and on the time profile of the stream of loan payments.

By the first method, initial payments can be as high as with existing VRMs and the balance would continuously decline by its amortization. This method does not resolve the unaffordability problems caused by initially high GDS and fast equity build-up.

By the second method, initial payments can be drastically reduced and equity accumulation is slowed down. The outstanding loan balance can increase if amortization payments fall short of the amount by which indexation increases the debt. Equity can be reduced if the value of the property increases by a smaller percentage than the index.

The design of indexed loans can be varied further by combining features of the two methods just outlined. Part of the adjustment to observed inflation can be put on the loan balance and the remainder added to the real rate.[7] Or - as with existing VRMs -

the actual loan payments can be held fixed for an extended period of time while all adjustments are added to the real rate and the difference between payments due and those actually received is added to the loan balance. These variations are not to be confused with partial indexation. Under partial indexation only a part of actual inflation is taken into account and the rest is made up by adjustment to expected inflation.

The different methods of adjustment to actual inflation have different risk characteristics and provide different opportunities for long-term contracting. The indexation of the loan balance is the only method that reproduces during times of price instability the pattern of loan payments and equity accumulation that lenders and borrowers have chosen in periods of price stability. In that sense, this is the only method that minimizes the financial risks in mortgage finance, posed by inflation. We have consequently chosen it as the main form of indexation to be discussed.

The principle involved in an indexed mortgage can be better understood in direct comparison with the standard mortgage. Tables F-1 and F-2 in Appendix F of Intervention and Efficiency present such a comparison of indexed mortgages with standard mortgages used to finance the purchase of a house or farm land. These tables are based on completely hypothetical cases and present the results of simulations over a 25 to 30 year period. For illustration purposes we reproduce here Table F-1 in Table 5.

This table compares, in the context of 10 per cent inflation, a fully indexed mortgage at 7 per cent real interest on capital indexed at 10 per cent with a standard mortgage bearing a 17.7 per cent nominal interest rate. The monthly indexed mortgage payments are lower than the standard mortgage payments for 9 years and larger thereafter. Consequently, the initial GDS is much lower under the indexed than under the standard mortgage. This difference can be quite substantial in the first years of the life of the loan. With a standard mortgage, the GDS declines sharply from 35.4 per cent in the first year to 4.4 per cent in the last year. With an indexed mortgage, the GDS would also decline but at a much slower pace from 19.2 per cent in the first year to 11.9 per cent in the last year. Secondly, equity accumulation in the home is much faster under the standard mortgage than under an indexed one. Starting with an 85 per cent loan-to-value ratio in both cases, equity is 16.3 per cent at the end of the first year under the indexed mortrgage but already 22.9 per cent under the standard mortgage. With a standard mortgage the owner has more than 50 per cent equity in 6 years while with an indexed loan he attains 50 per cent equity only after 16 years. It should be noted that in spite of initial increases in the balance outstanding (the balance outstanding only starts to decline after the 19th year), the indexed mortgage would be fully paid off at the end of the 25-year period. It should also be noted that the value of the house and the income of the borrower used to

calculate equity and the GDS are estimates on the assumption of steady 10 per cent inflation. Table 5 also shows clearly that the indexed mortgage duplicates the evolution of the GDS and the equity ratio that would have existed with a 7 per cent standard mortgage in a non-inflationary environment. However these are just hypothetical examples. Long-term standard loans are no longer available and inflation is neither steady nor predictable. It can be more interesting to see how borrowers and lenders would have fared if they could have substituted indexed for standard mortgages in the recent past. We have done just that for housing and farm finance.

4.2 Indexed Versus Standard Mortgages in House Finance

We have compared the ex-post results of hypothetical indexed mortgage loans with the actual results of 5-year or 3-year term borrowing to finance the purchase in 1974 of two types of homes in seven Canadian cities. (The reader will find in an Appendix details of the data used and an explanation of how the simulations were run.) The cities are Vancouver (Surrey), Regina (South and West), Toronto (Mississauga), Ottawa (West), Montreal (Pierrefonds and Mount Royal), Québec (Ste. Foy) and Halifax. The types of houses are a 3-bedroom bungalow (House No. 1) and 4-bedroom two-storey home (House No. 2). Standard and indexed mortgage simulations were made for each of these cases on the basis of historical data. The data cover the 1974-82 period and so the

simulations could not show extinguished loan balances. They are however relevant in that they cover an average period of occupancy and the average duration even for 25-year loans.

4.2.1 Elements of the Contract

The real interest rate on the indexed mortgage imagined to have been made in 1974 would in general have been well below the nominal rates on 3-year or 5-year term mortgages. The latter was 10.7 per cent in April 1974, the date of the original loan for house No. 1. The real interest on an indexed mortgage would have been around 2 per cent - differing slightly from city to city (see the Appendix for the definition and the calculation of these rates). These rates would have remained unchanged for the duration of the indexed loan contract assumed to be 25 years. By comparison, if the standard mortgage was granted for a 3-year period, it would have had to be renewed in April 1977 at 10.2 per cent and in April 1980, at 16.9 per cent.

The term to maturity is quite different for the indexed mortgage than for the standard one. While the indexed mortgage is for a 25-year term, the standard mortgage in our simulation is for a 5 or 3-year term although amortized initially over the same 25-year period. The indexed mortgage is a long-term financing instrument, while the standard mortgage is a short- to medium-term instrument.

The monthly payments would have been much lower with an indexed mortgage than with a standard one. Taking Halifax as an example, the first payment on an indexed mortgage on house No. 1 would have been $170 in May 1974 compared to $360 with the standard mortgage. In March 1982, the payment on the indexed mortgage would have been $342 compared to $507 with the 3-year mortgage and $368 on the 5-year one. For house No. 2 purchased in August, 1974 when the real rate was 3.3 per cent, the first payment in September 1974 would have been $283 compared to $519 with the standard mortgage, and $548 in March 1982 against $642 with the 3-year standard mortgage. For other cities and houses the differences would have been equally large. During the initial years of the loan monthly payments would have been cut almost in half by the recourse to an indexed mortgage.

The monthly payments on a standard mortgage are fixed for the term of the loan. They may increase if the loan is renewed at a time when market conditions are unfavourable and they can take quite a jump as was the case in April 1980 when the rate increased to 16.9 per cent from its 10.2 level three years earlier. For instance, standard loan payments for house No. 1 in Halifax, jumped to $507 from $349. In the case of the indexed mortgage, monthly payments would increase continuously but slowly throughout the period - only, of course if inflation persists - as a consequence of the adjustment of the loan balance. For instance, for house No. 2 in Montreal, payments would have risen from $365

in September 1974 to $725 in March 1982. Nevertheless, throughout those 8 years, the monthly payments on an indexed mortgage would have remained below the monthly payments on the standard one whatever the city or house.

Despite the continuous increase in indexed mortgage payments, the burden of monthly payments on the borrower would have remained fairly constant. The charts in the Appendix show that the indexed mortgage GDS is constant while the standard mortgage GDS starts at a much higher level and declines very fast. For instance, in the case of house No. 1 in Halifax, the initial GDS on a standard mortgage is 30 per cent in March 1974 but falls to 20 per cent in April, 1977 and 17 per cent in April, 1982. It jumped to 23 per cent in May 1980 because of the renewal of the loan at a much higher interest rate. With an indexed mortgage, the initial GDS would have been 17 per cent declining to about 14 per cent in August, 1975 and remaining around the 14 and 15 per cent mark throughout the rest of the period. As shown in Table 5, the standard mortgage GDS will continue to fall and will even fall below the GDS on the indexed mortgage. The latter will more or less remain stable for the duration of the loan, between 12 and 15 per cent.

The balance of the loan outstanding declines continuously with a standard mortgage. In the case of house No. 1 in Montreal, the balance was $32,300 in April, 1974 and fell continuously to

$29,000 in March, 1982. On house No. 2 in Vancouver the balance owing was $55,250 in August, 1974 and fell to $50,648 in March, 1982. By comparison, the balance of the indexed mortgage loan would have increased throughout this period. For house No. 1 in Montreal, the balance outstanding would have increased to $50,217 in March 1982. There would thus have been less equity accumulated with an indexed mortgage than with a standard one. The charts for various cities and different houses in the Appendix illustrate this point. In the case of house No. 1 in Halifax, for instance, the standard mortgage borrower had 15.5 per cent equity in his house in May, 1974 and 68.7 per cent in March, 1982. The owner achieved 50 per cent equity in his house by February, 1981. With an indexed mortgage, equity would have been 14.6 per cent in May, 1974, remained below 20 per cent until September, 1980, and would have reached 47 per cent in March, 1982. Two factors have an impact on equity accumulation: the change in house prices and the change in the loan balance. The former affects standard and indexed borrowers equally. The latter can go in opposite directions depending on the loan type. The combination of these two factors will have different effects on equity accumulation depending on their relative movement.

Halifax and Regina are cities where house prices have continuously fluctuated around an increasing trend over the period considered. The increase in house prices was sufficient to compensate for the increase in the loan balance indexed on the

CPI. Thus equity accumulation was positive with both a standard and indexed mortgages. In Pierrefonds (Montreal) the situation was somewhat different particularly with respect to house No. 1. The price of this house fell from $38,000 in April, 1974 to $29,000 in June, 1977. It remained stable at that level until February, 1978 and increased slowly thereafter. By March, 1982, it had however reached $54,500. Thus, over the first few years of the life of the loan, and at least until January, 1978, the rate of equity accumulation with a standard mortgage was slow and erratic. Equity declined and turned negative between December, 1974 and April, 1975 and between January, 1977 until May, 1978. With the indexed mortgage, periods of negative equity would have been longer and more pronounced. Equity would have been negative from August, 1974 to August, 1980, at -30 to -35 per cent for up to about 6 months. By the end of the period, equity would only have been 10 per cent of market value. In Vancouver the equity in house No. 2 financed with a standard mortgage rose from 15 per cent to reach a high of 69 per cent in April, 1981 and declined thereafter to 62 per cent in 1982. With the indexed mortgage, equity would have declined from September, 1974 to a low of 0 in January-June, 1979, then increased to 53 per cent in February, 1981, declining again to 36 per cent in March, 1982.

4.2.2 The Risks and Returns

4.2.2.1 From the Lender's Point of View

The lender would receive a gross return from an indexed mortgage equivalent to the income he would get from alternative forms of mortgage investment.[8] To have an equivalent net return, he may have to charge in the first year of the introduction of these indexed mortgages a slightly higher interest rate to compensate for the higher cost of initiating and introducing this new instrument. Here, of course, the government could play a leading role in perfecting the design of this mortgage and in conducting on behalf of the lender the analysis of the loan application. But the main difference between this instrument and other forms of investment is that only part of the return comes in the form of cash. This may cause problems to some deposit-taking lenders if the savers who supply them with funds demand that their total income be paid out in cash. There are several ways to overcome this problem. For instance, the lenders may themselves issue indexed instruments to gather the savings needed to fund indexed mortgages. In a proposal accompanying the June 1982 budget, it was suggested that indexed mortgages be financed with indexed term deposits. Another possibility - the one retained by the Council - would be to sell mortgages to institutions that have only long-term liabilities and could therefore be satisfied with receiving only a portion of their annual return in cash. This would, for

instance, be the case of pension funds and RRSPs. In fact, by receiving income in such a fashion, there could even be a better match between their cash inflow and outflow. Moreover, their return would be protected from the erosion by inflation. There also are some tax problems such as those indicated in Intervention and Efficiency. As part of the return comes in the form of an increase in the book value of the assets held by the lender, will this appreciation be considered for tax purposes as income or as repayment of capital? In the former case, the lending institution would owe taxes on income it did not receive in cash. This may create an additional cash-flow problem. By recommending that indexed mortgages be initiated for sale to tax-exempt institutions, pension funds, and RRSPs, the Council found a solution to this problem, at least for the short-run until a time when there may be a more global reform of our taxation system.

Let us now turn to a comparison of the riskiness of indexed and standard mortgages. The interest risk associated with a standard mortgage is greatly reduced by indexation as the return to the lender is adjusted to realized inflation without re-opening the mortgage contract. The portfolio risk is very similar to what it was with the 25-year standard mortgage. However, this risk may be higher compared to that of the 5-year mortgage if the lender is unable to attract long-term funds to finance his indexed mortgages and if there is no secondary market for long-term loans. This is why the Council felt that the institutions most likely interested

are the pension funds and RRSPs and that government should insure indexed mortgages and promote a secondary market. The situation with respect to the risk of loss by default is much less clear. The lower and more stable GDS in the case of an indexed mortgage should substantially reduce the risk of default. However, the much slower pace of equity accumulation and the possibility that the loan balance outstanding will exceed the value of the house - a possibility which is greater with an indexed mortgage than with a standard one - reduce the probability of recovery in case of default. Many lenders have expressed concern that the slower rate of equity accumulation and the probability of negative equity for an extended period of time would also increase the number of defaults.

The risk inherent in slower equity accumulation by indexation cannot be denied. One must, however, be clear about the context in which this risk arises and the context in which it is greater than the risk of standard lending.

The notion that indexed loans can be riskier than standard ones presupposes that inflation will continue and that during inflation the relative price of housing is more unstable than during a period of price stability. Taken by itself, inflation cannot make indexed loans riskier than standard long-term loans were during price stability. Indexation recreates as closely as is possible the financial characteristics that long-term loans had in periods

of price stability. If 75 per cent loan-to-value was safe in the 1950s, when borrower incomes and house values could not be assumed to increase annually by large percentages relative to outstanding loan amounts, then 75 per cent loan-to-value ought to remain acceptable when indexation maintains similar relationships between incomes, prices, and loan amounts. We have also noted that the lower GDS made possible by indexation is an offsetting risk-reduction factor.

Secondly, the risk of a loan cannot be considered from the lender's point of view in isolation from his overall portfolio. Table 6 illustrates some of the differences among and within cities between fluctuations in the prices of house No. 1, of house No. 2 and of the average value of MLS sales. The simulations over the 1974-82 period show that if in Pierrefonds (Montreal) equity in house No. 1 would have turned strongly negative over several years with an indexed mortgage, this would not have been the case with house No. 2 in Mount Royal. Moreover, as will be seen later, other factors of indexation could be chosen in place of the consumer price index used in the examples we discussed so far. In conclusion, looking at individual indexed mortgage loans as well as at the lender's portfolio in general, it appears to us that the risk of loss by default is not greater with an indexed than with a standard mortgage, certainly not compared to a short-term standard mortgage. The risk of loss by default could even be lower because of the much lower and steadier GDS.

4.2.2.2 From The Borrower's Point of View

The indexed mortgage offers to the borrower a better match between his mortgage payment and his income. It gives him a means to avoid the tilt in the real burden of the loan, which made it very difficult for some to meet their mortgage obligation in the initial years of the contract. On the other hand, the slower equity accumulation may deprive the borrower of some non-pecuniary benefits of homeownership. However, this may be the only way to afford the purchase of a home and to reduce the risk of losing one's home because of excessive mortgage payments. A 17 per cent or 15 per cent GDS is much more affordable for a new homeowner than a 30 or 35 per cent GDS. As in the case of the lender, the borrower's interest rate risk is greatly reduced and his portfolio risk also disappears as the borrower or homeowner would be financing a long-term asset with a long-term liability.

The foregoing should not be construed as meaning that indexation is only for those who could not otherwise gain access to home-ownership. A borrower who can afford standard mortgage payments may opt for indexation as a convenient cash-flow management technique that facilitates the finance of his overall investment in housing and other assets. Indexed borrowing can free initial cash-flow for other uses, such as investment in non-housing assets that compensate for the slower growth of equity in the home. A

borrower following such a course may combine the advantages of homeownership and liquidity.

4.2.3 Comparison with Other Mortgage Schemes

So far, we have compared the indexed with the standard mortgage. It is interesting to compare it also with other forms of mortgages. With a variable rate mortgage the borrower can make monthly payments that are slightly lower than those on a standard mortgage but higher than indexed mortgage payments. The interest rate risk is reduced for the lender but increased for the borrower. With a graduated payment mortgage the borrower benefits from reduced payments in early years but these may rise faster than income because their rate of increase is preset and not tied to actual inflation. The indexed mortgage would make a better match between the flow of payments and the flow of borrower income. In terms of risk of default, there is a much slower equity accumulation in early years as the balance of the loan increases. With a shared appreciation mortgage, the borrower benefits from substantially lower interest rates compared to the standard mortgage. In fact, the interest rate on such a loan could be comparable to the real rate on an indexed mortgage. However, the lender shares in the owner's capital gain and the borrower may need to pay a large amount at the end of the term of the loan or on resale. For the lender, there is an uncertain return on investment as it depends on the appreciation of the property. With an indexed mortgage, the lender obtains a more certain return over the life of the loan.

4.3 Farm Finance

While some farms may have very high debt loads, farming as a whole has a very strong equity base with only 18 cents of debt per dollar of assets. Eighty per cent of the value of these assets is represented by land and buildings. Thus it would seem that there is room for more farm mortgage loans to finance the entry of young farmers or the expansion of established farms but this is not the case. Asset value is not the only factor of credit worthiness. When other factors are considered, one finds a real problem in farm finance.

Although average debt loads are low and asset values were rising, the interest coverage ratio in agriculture has been declining over the years. The number of times that gross farm income could cover interest on farm debt fell steadily from almost 20 in 1961 to about 4 in 1981. This was due to rising interest rates and falling cash income flows. The falling interest coverage is not the result of increased debt loads. The farm debt to assets ratio has not increased that much over the past 20 years. This points to a structural problem in farm finance, one that is aggravated by inflation. Sound finance requires at all times that the characteristics of assets and debts be matched as closely as possible. Long-term investment in land should be financed by long-term mortgage loans. The amount of the loan

should correspond to the value of the land. The income from the land should exceed the interest cost of the loan without having to add to land rent the income derived by the farmer from other sources such as farm and off-farm labour, and, finally, loan interest payments should correspond to the cash income from land. Failure to match the characteristics of loans and assets can increase the risks suffered by farmers and lenders. Traditional mortgage loans do not match the farm situation as closely as would be desirable. Even when the value of a farm asset exceeds the interest cost of the loan, the cash-flow from the asset may fall short of the interest. Land appreciates but yields a low cash rent equivalent to about 3 to 5 per cent of land value, while existing loans require cash payments for interest that -- even when subsidized --are high compared to cash rents, and the loans do not appreciate as time goes on. A new loan instrument is needed that will match more closely the investment characteristics of farm land. The indexed loan recommended by the Economic Council of Canada in its latest report Intervention and Efficiency is one such instrument.

Indexation of farm loans raises some of the same questions as those about residential mortgages and also additional questions stemming from the greater instability of farm income and land prices compared to wages and house prices. In relation to these we have made mortgage tables to illustrate what the situation of an average farmer might have been in different provinces if he had borrowed indexed money in the past.

4.3.1 Standard and Indexed Farm Mortgage Loans

In this section we compare the farm financing costs under standard and indexed borrowing. The comparison is made for an average farm and as such differs from the situation of any particular farm. Whereas in the case of housing the Royal Trust Survey provided data on prices of carefully defined houses in different localities, in the case of agriculture there were no comparable survey data available to us. Instead, series of annual farm income and of the value of farm land and buildings were constructed by applying indices of income and land prices to the average income and land value per farm in 1976. The latter figures were obtained from Statistics Canada, Farm Net Income, (21-202). This is also the source for annual net farm income by province, 1961-81. An index of farm land prices, by province, is published in Farm Credit Corporation Annual Reports.

Farm loans tend to be made at lower loan-to-value ratios than residential mortgage loans. A figure of 60 per cent is used for the purpose at hand. Farm mortgage payments are seldom made monthly. They are made quarterly or semi-annually. As farm income and value data are annual, we have made mortgage tables assuming annual mortgage payments.

The first comparison is between standard 5-year and CPI-indexed, 25-year loans that could have been made at the end of 1961 (Charts

33-38). At that time, the conventional mortgage rate was 7 per cent and that would also have been the yield over the first five years of a loan at 4.5 per cent real indexed to the CPI. Since inflation rates increased sharply in later years, the CPI loan would have been a much better investment for the lender than the conventional loan, unless the borrower refinanced the loan sometime after its fifth-year.

The higher yield of a CPI loan would not necessarily have meant an absolute disadvantage to the farmer. The ratio of his mortgage payments to net farm cash income before interest on indebtedness would have been less with the indexed than with the standard loan until 1974. For a farm in Ontario of average size and value the GDS would have been 32.4 per cent in 1962 with a standard loan and 25.5 per cent with an indexed one. Equity ratios would have been remarkably close under both types of financing and in no case would indexation have led to negative equity. For instance in 1970 they would have been 77.6 and 73.1 per cent with standard and indexed loans, respectively. There are two reasons for this: the high initial equity and, more importantly, the fact that land prices rose faster than the CPI.

It is important to note that a higher GDS in the final years does not necessarily imply a lower income since the amortization quota included in the blended mortgage payment constitutes a part of farm income. Similarly, a lower GDS in the early years does

not imply higher income either. The difference is in the time-shape of cash outlays. Indexation reduces the cash demands on the farmer when his equity is low and increases them when his equity is high. This can reduce the risk of farm finance considering that a high GDS and a low equity ratio are factors of default risk.

A reduction in financial risk is important to farmers especially considering the already high risks they face in production and marketing. These are illustrated by the variability of their net income. A mortgage indexed to farm net income could be even more advantageous to farmers as it would directly offset some of their production risks. These would be assumed by lenders, with the exception of those specific to the location of the farm, which would still have to be covered by crop insurance.

The real rate would depend on the risks transferred from farmers to lenders. The yield differential is similar to that between stocks and bonds but its size is a matter of speculation. For that reason we have not tabulated mortgage payments linked to farm net income comparable to wage-linked residential mortgages.

The real rate depends also on the expected rate of increase in the index. This varies from time to time and raises the question of what comparisons can be made for loans contracted at the end of 1970, either conventional or linked to the CPI. Standard, 60 per

cent ratio loans would have been unaffordable for the average farm in Alberta in 1970 since the initial payments would have exceeded net income before interest. The standard loan payment would have been 131 per cent of income but only 59 per cent with an indexed loan. In all other years and also in Saskatchewan and Ontario, indexed mortgage payments would have been less than the conventional without greatly impairing the equity position of farmers or, for that matter, the income of lenders (Charts 39-44).

4.4 The Choice of Indexation Factors

"The choice of an index has consequences for public policy and for the acceptance of indexation on the part of borrowers and lenders. In every case, the index should be easily verifiable and one that can be tracked throughout the term of the loan, preferrably 20 years and more. From the point of view of public policy and of the lender, the index must be a very broad one, such as the CPI or the implicit GNP deflator. These are broad aggregates that the monetary and fiscal authorities seek to stabilize and they correspond to the general purchasing power that a lender wants to preserve for his future use. Borrowers, however, prefer that their debt be linked to prices or wages that directly determine their income and ability to pay."[9] The choice of an index has consequences for the level of the GDS and for equity accumulation in the property. In house finance, we have simulated mortgages indexed to consumer prices, wages and house prices. In farming,

we have simulated mortgages indexed to the consumer price index and to farm land prices.

Charts 29 to 32 compare 3 year-term standard mortgages with mortgages indexed to the CPI, wages and house prices for Halifax and Montreal. Halifax and Montreal have been chosen as they represent two extremes with respect to the behaviour of house prices.

As can be seen, the GDS on a loan made in 1974 is lowest and most stable if the mortgage loan is indexed to wages. The GDS is highest and least stable when the mortgage is indexed to house prices. In the case of Montreal, the GDS with a mortgage indexed to house prices is almost identical to the GDS on a 3-year term standard mortgage. Therefore, from an affordability point of view, mortgages indexed to house prices would not always be of advantage to the borrower. With the benefit of hindsight, the preferences of a 1974 borrower would have been first for a mortgage indexed to wages, next the CPI and finally to house prices.

Mortgages indexed to wages would have slowed equity accumulation the most. In the case of Pierrefonds (Montreal), indexation to wages would have accentuated negative equity in the home. The fastest equity build-up would have been obtained with indexation to house prices. In the case of Montreal, lenders could have

preferred - with hindsight - a loan indexed to house prices to the standard mortgage. Indeed, equity would have been between 15 and 20 per cent throughout the period, while with the standard mortgage there have been at least three years of negative equity and a decline in the rate of owner's equity in the home.

This fact that land prices rose faster than the CPI could be used to some advantage by farmers by indexing to land prices. To yield the same as a conventional loan in 1961 and over the first five years, a loan linked to land prices should have been at a negative real rate (Charts 45-50). Even at that negative rate, the total return over a 20 year term could have been greater than the yield of conventional loans, since land prices often rose at more than the difference between the real and the nominal rate.

The land-indexed debt burden (GDS) of farmers would have been lower than that caused by a conventional loan. Indexed borrowing would have increased the net cash-flow after mortgage payments for interest and principal until 1977 in Alberta, 1970 in Ontario, and 1980 in Saskatchewan. By the time indexed payments exceeded the standard ones, a significant part of the payment would have been for amortization and would thus have been part of income.

Since, with hindsight, borrowers and lenders could have preferred different indices, it may be supposed that in future there may also be a divergence between the interests of borrowers

and lenders which would have to be resolved to draw up an indexed mortgage loan. We have here only provided a few examples of indexation factors. Many other could be devised. Common ground could be found if one remained open to many possible factors of indexation. This could make the indexed mortgage less uniform and may make the development of a secondary market in these mortgages more difficult. This is why the Council recommended that in the initial stages, the government be involved providing information needed to familiarize the lenders with the various types of mortgages, that it insure these mortgages against default by the borrower and that it promote a secondary market. An institution could be set up to intermediate between mortgage lenders and borrowers who wish to use different price indices. Such an intermediary would, for example, sell CPI linked bonds to buy wage linked mortgages. This would enable borrowers to make mortgage payments linked to an index of wages paid to members of their different professions. Since in the long term, average wages fluctuate in line with the CPI, the intermediary could make its CPI linked payments.

In the case of agriculture, the differences between linkage to the CPI or property values are not as dramatic as in the case of housing as CPI linkage would not have resulted in negative equity. The larger difference would be with indexation to farm net income.

The choice of an index introduces new opportunities but also presents practical problems that have to be resolved. Some of these extend beyond the strictly financial into broader questions of monetary policy and stability. Both are discussed in the following brief review of the foreign experience.

Section 5: The Foreign Experience

Indexed real estate loans have been made in a number of foreign countries. In some they were discontinued and in others they were introduced just recently. Many of these countries have had a history of chronic inflation and indexation was forced on them as a means to create a mortgage market, or as a means to revive a defunct mortgage market. In such countries, indexation was not restricted to mortgage loans but was a more general tool serving a variety of objectives such as the protection of small savers, the development of indigenous capital markets and easing the transition from high to lesser rates of inflation. In other countries, indexation of mortgage loans was introduced to change the shape over time of mortgage payments relative to the borrower's income, or to reduce the initial burden of mortgage payments.10

Finland, Israel and Brazil are in the first group of countries where indexation was (or still is) widespread as a matter of general economic policy. The second group of countries consists of Sweden, Norway, Iceland and Denmark and may grow to include the United Kingdom and the United States.

The foreign experience does not exactly fit the context of this paper. Here the discussion is about the introduction of new financing techniques and the provision of more financial choices

to permit a finer matching of assets and liabilities. The objective is what the Lortie Committee called "real contracting".[11] In this context, one observes the foreign experience to learn about the risk characteristics of indexed loans, their acceptability to borrowers and lenders, and the problems that may be encountered in the development of this kind of instrument.

The question that is asked more often, however, is whether indexation creates or increases inflationary expectations, and whether it destabilizes the monetary system.

The first part of the question is somewhat psychological and therefore incapable of illumination by economic reasoning. Historical experience, however, shows that indexation is not something that can be associated exclusively with inflation. The idea of indexation arose also in deflationary times. It captured some of the greatest minds in economics who saw it partly as a means to prevent unnecessary bankruptcies associated with deflation. Writing in 1876, during the "Long Depression," Stanley Jevons observed that one of the advantages of indexed loans is that

> The calculations of merchants would be less frequently frustrated by causes beyond their control, and many bankruptcies would be prevented. Periodical collapses of credit would no doubt recur from time to time, but the intensity of the crises would be mitigated, because as prices fell, the

liabilities of debtors would decrease approximately in the same ratio.[12]

Neither can indexation be associated with particular schools of thought. Its advocacy by Milton Friedman and its acceptance by his South American students at the University of Chicago is too well known to be repeated here. Financial indexation had however been proposed also by John Maynard Keynes who in 1924 recommended that the British Treasury issue indexed bonds, which it finally did a few years ago. Such bonds, he argued, would reduce the real cost of government borrowing since bondholders would accept a lower real yield in exchange for the purchasing power guarantee.[13] In saying this, Keynes repeated a recommendation Alfred Marshall published in 1887, when wholesale prices were still falling.[14]

While the idea of asset indexation cannot be associated exclusively with inflation, it must be associated with changes in the purchasing power of money and with monetary instability. The possibility that asset indexation will destabilize the monetary system is of great concern to the critics of indexation. In this respect, one finds two strands of thought. One is to debate the merits of index clauses over other commodity standards. Walter Bagehot, for example, writing in 1875, thought that compulsory indexation would discourage trade because of the increased uncertainty in exchanging currency for gold.[15] In 1892, Robert Giffen echoed Bagehot's criticisms of indexation but added that the proposal would be feasible with an inconvertible and managed paper currency.[16] That is the type of currency we have in Canada.

Related to this fiduciary currency is the other strand of thought: that all aspects of indexation - wage, tax and financial indexation - tend to increase the effect on the price level of any inflationary or deflationary shock. Of the three kinds of indexation, the financial has the greatest destabilizing effects. However, the fundamental condition for such an effect to exist is that part of the government deficit be financed by Central Bank credit.[17] The greatest danger for stability arises if government issued indexed bonds and made fixed-rate long-term loans to the private sector. Should the price level rise, government would then have greater cash outlays for interest on its outstanding bonds, and no increased income from its fixed-rate loans. The resulting deficit would increase the price level again if it was financed by Central Bank credit. Should the price level fall, government would have a surplus equal to the difference between fixed-rate interest income and falling payments on indexed bonds. If that surplus was then used to extinguish debt to the Central Bank, the price level would fall cumulatively. In this way, mismatching of government debt and assets can totally destroy what is left of monetary stability.[18]

This extreme instability is part of the foreign experience, where indexation was abandoned (Finland) or managed and modified (Brazil) to reduce the inflationary impact of a devaluation. In both these countries, fixed-rate loans were financed by indexed debt. In Israel and Brazil, government and its agencies issued

indexed bonds or deposits while making fixed-rate, long-term development loans. In Finland, commercial banks suffered from a similar mismatch, although they did attempt to pass changes in the average cost of indexed deposits on through charges made for unindexed loans.

In this paper, it is not proposed that government issue indexed debt or that financial institutions assume indexed liabilities without acquiring matching indexed assets. Thus, the instability factor discussed above need not detain us any longer. But what does the foreign experience tell us about the acceptability of indexed loans by borrowers and lenders? The foreign picture is clouded by various restrictions on index choice related to the purpose for which indexation was introduced. The choice of an index affects the risk of using an indexed instrument and this risk in turn affects the acceptability of the indexed instrument. Interpretation of foreign events is made even more difficult by policy measures that were construed as official tampering with the index.[19]

Borrowers and lenders face different risks when using indexed instruments and have a common aversion to risk. A lender wants to avoid a situation in which the value of his asset and his cash income therefrom could fall while his income from other sources is also declining. The borrower would not like the amount of his debt and interest payments due in cash to increase while the

income that he derives from the asset financed with the borrowed funds could decline. Should also the value of this asset fall as the debt increases by indexation, the lender would have less security for his loan. Consequently, an ideal index should be negatively correlated with the income and wealth of the lender, and positively correlated with the income from and the market value of the collateral asset that secures the loan.[20] This fourfold coincidence of desirable correlations may be too much to ask for and an ideal index may be impossible to find.[21] It should not even be sought because -- as will be discussed later -- indexed lending can be arranged in ways that make it unnecessary to continue the search. In actual practice, however, the search has not gone far enough and the indices chosen fell too far from the ideal depending on the particular objectives pursued in each case.

Where the objective was to protect depositors, the choice fell on cost-of-living or wholesale price indices. That made indexation attractive to lenders but could have been intolerable by borrowers. The unattractiveness to borrowers of a broad price index may be the reason why Finnish banks and the Brazilian and Israeli governments continued to make fixed-rate loans.

Where the objective was also to protect borrowers, the index was capped and floored, or switched to a different index by some trigger mechanism. For instance, the Danish indexed mortgage

scheme introduced in April 1982 provides a cap on indexed monthly payments in years in which average wages do not increase as fast as prices. Monthly payments are linked to prices or wages, whichever is lower. The capital amount, however, is linked to prices in every case and the amortization period is lengthened whenever a lower index is applied to calculate periodic payments.

Greater protection of borrowers was achieved by linking interest or capital to a price intimately related to the borrower's income. Such was the case with Electricité de France bonds linked to the price of a kWh and with Sunshine Mining Company silver bonds.[22]

Loan indexation is most common in the case of home mortgage loans. Indexed residential mortgages existed in Iceland, Norway, Sweden and Israel and are widespread in Brazil and Argentina. This suggests that residential mortgage loans present the least difficulty in choosing an index that is mutually satisfactory to borrowers and lenders. In the United States, the Federal Home Loan Bank Board issued, on August 16, 1982, new regulations that allow savings and loan associations to make loans indexed to national or regional price indices, or to indices of personal income. Prior to that, pension funds made indexed condominium loans in Utah and Georgia.[23] In the U.K., building societies have begun to accept indexed deposits backed by their investment in indexed U.K. Treasury bonds. It is conceivable that they would in future expand their indexed deposits and diversify their indexed

assets by making indexed mortgage loans in substitution for the variable-rate loans which currently are their principal asset.[24]

That home mortgages are suitable for indexation is shown also by an absence of reports of indexation-induced defaults. There do not seem to be unusual financial risks created by indexation, as none have been reported in the literature on this subject. A reason for this may be that, in principle, indexed lending cannot be very different from lending in a period of perfect price stability. In times of inflation, an indexed loan is riskier than a conventional one because the homeowner's equity build-up and the reduction in his gross-debt-service ratio are slower with the former than with the latter. The borrower and lender of standard high-ratio loans are bailed out by inflation, as it were. On the other hand, an indexed loan would be safer than a conventional one in case of a prolonged deflation. During a long period of relative price stability, however, the indexed loan would be indistinguishable from a conventional one. Both are amortized at a slow rate and the borrower has a relatively constant burden of monthly payments until the loan is paid off.

In practice, however, price level changes may be accompanied by greater variability in relative prices, especially in the price of housing (as an inflation hedge) relative to the index applied to housing funds. The margin of safety of high-ratio loans may be too small if the loans are indexed to something other than house

prices. This seems to have been the experience with the Swedish parity loans. This was a system introduced by the social democrats in 1968 under which the Swedish National Housing Board made third-mortgage loans of up to 30 per cent of house-value. The borrower's monthly payment was a blended payment towards all three loans and this payment was indexed to a "parity number" reflecting nationwide average construction costs. Initial payments started at the low level of a "base annuity" of a little more than 5 per cent. After deducting from the total monthly payment the fixed payments for the first and second loan, little was left for interest on the third, unless the parity number and the total payment had grown sufficiently. This system was fairly popular in that 95 per cent of multi-family and 50 per cent of new single-family homes were so financed. It worked well while the market rate of interest was below 6 per cent and the parity number grew by more than 3 per cent. Under those conditions, the total nominal debt increased for about eight years and was fully paid off in 25 to 30 years. Recently, however, nominal interest rates have been higher and homeowners troubled by money illusion suffered some anxiety as their nominal debt kept growing.

Accordingly, recent official Swedish proposals for even wider indexation of assets, capital income, and taxes include a recommendation of a double guarantee to homeowners: first, the parity number is to be differentiated by region and property class and there would be a switch from construction to property price

indices if house prices should rise slower than the index. A second cap would be provided by the increase in average wages. These complicated arrangements seem to be dictated at least in part by the desire to continue with a policy of low down payments.[25]

While there is information on indexed home-loans in several countries, there seem to be no reports of indexed farm loans. This is strange since farmers are already familiar with real contracts, namely sharecropping. A sharecropping contract is a distant cousin of a short-term loan of capital indexed to the price of the mortgaged security (wherefor it can be made in a 100 per cent loan-to-value ratio and without amortization), and with interest indexed to the price of the crop.

Finally, let us turn to the problems that may be encountered in developing new indexed loan instruments. In this, the emphasis will be on the main problem of index choice and risk. The foreign experience shows two contrasts: either indexation is introduced on a broad scale by government, using a broadly based index, or it is introduced sporadically by borrowers, using a very narrow index that figures prominently in their financial situation. Of course, there are also countries where indexation is prohibited, as it was in the U.S. from 1933 to 1977 and still is in Germany.[26]

Where indexation was promoted by government, it has not spread much beyond housing loans into all types of lending activity. This may be attributed to the prescription of broad indices which are unattractive to many borrowers. Their unattractiveness is shown by the different choice of index made in sporadic indexation experiments initiated by borrowers. These experiments have not gained widespread acceptance among lenders as they did not represent genuine purchasing power guarantees. Thus the main difficulty in developing indexed loans seems to stem from opposite results of identical risk-averse behaviour of both borrowers and lenders. These could be reconciled by index-intermediation. An intermediary can issue CPI-bonds or accept CPI-deposits if he can amass a large portfolio of loans indexed to different commodity and asset prices.[27] The average of these prices can be highly correlated with the CPI even if none are so correlated when considered in isolation. Management of such a portfolio may require opportunities to buy and sell individual items on a secondary market. Thus a potential innovator faces a formidable task: he has to work three sides of a triangle, creating new assets, new liabilities, and a new secondary market. Reform at only one side will produce no more than a little used curiosity. Large-scale reform of the three aspects of the business may be beyond the means of a private innovator. That may be why the task often fell to governments. At the very least, a government needs to clarify its income-tax regulations and amend legislation governing interest charges. In addition, it may offer loan

insurance as a substitute for a portfolio diversification that a lender cannot bring about from the start. Small subsidies may also be in order since the protection of the purchasing power of small savers and pensioners may be regarded as a social benefit, either because it substitutes for other social assistance or because it is analogous to social benefits from research and development of new business generally. Larger subsidies designed to assist homeownership by reducing debt-service ratios, and subsidies to assist beginning farmers would be less necessary as the same objectives could be achieved by indexation.

Section 6: Conclusion

The findings of this paper can be summarized in a few propositions.

1. The mortgage market in Canada has undergone considerable changes over the past three decades, mostly in reaction to inflation;

2. Inflation broke the equilibrium of the 1950s and early 1960s by increasing costs and risks to lenders;

3. Lenders reacted by shifting risks and costs back to borrowers. The long-term mortgage disappeared, interest rates increased, the GDS rose;

4. Inflation temporarily reduced the risk of high-ratio lending by speeding up equity accumulation at the cost of raising debt-service ratios;

5. New instruments such as GPMs and VRMs have appeared to provide alternative adaptations of mortgage loan terms to inflation;

6. The indexed mortgage is a more flexible instrument that will reproduce the financial opportunities that lenders and borrowers had in periods of price stability;

7. The indexed mortgage is not necessarily riskier than the standard mortgage and exists in some form or another in some countries;

8. It is not, however, the kind of innovation that can be made without government support with appropriate legislative initiatives and insurance. Subsidies need not form part of this type of support.

Appendix: The Data Used in the Housing Simulations

House prices are those in the Royal Trust survey of selling prices of 3-bedroom bungalows (house No. 1) and 4-bedroom two-storey houses (house No. 2). Table 7 shows average house prices in each of seven cities. It should be noted that these are averages for a specific type of house and location. Three areas have registered continuous price increases of house No. 1: Halifax, Regina (South and West) and Surrey (Vancouver). Three other areas, and particularly Pierrefonds (Montreal), have at times registered a drop in the price of the house No. 1, a drop which in some cases was rather substantial. Initial house prices also differed from city to city. For instance, in April, 1974 the price of house No. 1 was $38,000 in Pierrefonds (Montreal) and $67,000 in Mississauga. However, the difference in the initial house price does not have an impact on the results of the simulation. For house No. 2 the price series begin in August, 1974 and that is therefore the assumed purchase date of house No. 2.

The borrower's initial income was set at a level such that the initial GDS on the standard mortgage on house No. 1 would be 30 per cent. For loans on house No. 2 the initial GDS was set at 30 or 20 per cent.[29] The income of borrowers in later periods has been established for each city in proportion to the average weekly earnings of hourly rated workers in manufacturing in that city,

adjusted to 40 hours per week. As can be seen in Table 6, the increase in wages has always been faster than that of the CPI and almost faster than the increase in house prices.

The inflation rate is measured by the progression of the CPI index in each city. This is the overall index which gives results very similar to those from using only the housing component or the general index less food prices, since all three indices are highly correlated. The inflation rate is almost the same in each city.

The nominal interest rate is the 5-year conventional mortgage rate, considered to be the same in every city. The April, 1974 rate of interest was 10.7 per cent. The rate for renewal of a 5-year loan was 11.05 per cent in April, 1979. The rates for renewal of 3-year mortgages were 10.25 per cent in April, 1979 and 16.9 per cent in April 1980. Monthly payments include one-twelfth of annual property taxes shown in the same Royal Trust survey. The initial nominal rate on a loan for house No. 2 is the conventional rate in August, 1974. Rates for subsequent loan renewals are also as of August of the corresponding year.

Standard mortgage payments are based on a loan-to-value ratio of 85 per cent and 25 year amortization with corresponding reductions of the amortization period on renewal after 3 or 5 years. For house No. 2 we have also assumed an initial 70 per cent loan-to-value (although not shown in charts).

Indexed mortgage payments were linked to three alternative indexation factors: the consumer price index, the index of wages and Royal Trust survey house prices for the type and area. In all three cases loan-to-value ratio is 85 per cent with an amortization period of 25 years and a term of 25 years. The loan balance and payments are adjusted to the index on a monthly basis. The real rate of interest used to calculate monthly payments on an indexed loan varies from city to city according to the factor of indexation.

The nominal yield of a loan (y) is related to its real yield (r) and to the rate of change in the purchasing power of money (p) by the formula

$$1 + y = (1 + r)(1 + p)$$

General economic conditions determine p and so competition in the loan market can determine either y or r, but not both since the moment one of them is determined, the other follows from the formula. The values of y, r, and p are, however future values of money, some of which will be known only as time goes by. In the case of standard loans, y is known at the time of signing the loan of the basis of expectations of r and p. In the case of an indexed loan, r is set at the outset and y will be discovered as p becomes known. If there was such a thing as perfect foresight, this difference between standard and indexed loans would not exist. Standard and indexed loans would have the same real and nominal yields. Except for a small difference caused by lagged

indexation, this is the case with the mortgage tables published in Appendix F of Intervention and Efficiency. Those tables were constructed with perfect knowledge of completely artificial data put in. For this paper, we wanted to construct mortgage tables based on historical data, including the historical real rate of mortgage interest. This requires direct observation of either real rates of interest or of expected inflation rates. If there had been a functioning market for both standard and indexed loans one could have used the real rate r that would have been determined in the latter to deduce inflation expectations (p) from nominal rates (y), assuming that competition equalized real returns in both markets. This additional information would increase market transparency if it provided a unique and fully satisfactory measure of the expected change in the purchasing power of money. There is, however, no best single way to measure the purchasing power of money. The index p can be constructed in many different ways and may vary from one indexed loan to another. Given r, the nominal yield y will vary from one loan to another depending on the choice of index measuring p. Thus, different securities can have widely differing nominal yields and this is actually a familiar condition of existing financial markets. The nominal yields of Eurobonds vary depending on the expected rates of depreciation (p) of the currencies in which they are denominated. Dividend yields and price/earnings ratios of common stocks vary depending on expected rates of dividend and earnings growth. The dividend yield of blue-chip common stocks could be

used as a benchmark to establish the real rate on an indexed mortgage loan in the temporary absence of observable market rates for such loans, were it not for a widespread feeling that stocks were undervalued in recent years.

A more common method to establish real yields is to deduct the one-year rate of price inflation from the nominal interest rate. This would seem inappropriate for the purpose at hand. It supposes that expected rates of inflation equal current rates which is a hazardous assumption to make when contemplating long-term loans.

To construct the mortgage simulations shown in this paper we have made a compromise between the assumption of perfect foresight resulting in equal nominal yields of standard and indexed loans, and the assumption of static expectations or that real yield equals the nominal less the current rate of inflation. We have assumed equal nominal yields for indexed and standard loans over the first five years. The real rate on an indexed loan was set equal to $(1 + y)/(1 + p) - 1$, where y is the standard loan rate at the time of loan disbursement, and p is the compound rate of increase in the index over the next five years or until the end of the "simulation period," whichever is shorter. The rate p was taken to be either the percentage increase in consumer prices, the increase in property values, or the increase in the borrower's income. Different initial five-year averages of p implied

different "real rates" on alternative indexed loans of equal initial nominal yields. The initially equal nominal yield makes our indexed loan examples reasonably competitive in nominal terms with 5-year standard mortgages and long-term bonds, in spite of the sometimes negative real rates.

Table 9 shows the real interest rates on loans for house No. 1 in each city and tied to the three indices. With the exception of Regina, the 1974 real rate is higher when a loan is indexed to house prices than when it is tied to wages, since in general wages rose faster than house prices during the 1974-79 period.

Had a market existed in 1974, for indexed mortgages or real contracts, the real rate would have been, in each case, determined by a tatonnement process driven by the interaction between demand and supply. The factors we used in our ex-post estimation of the real rates would not have been considered directly by lenders and borrowers in their ex-ante real contracting. But had the market process, in both nominal and real contracts worked freely and properly the ex-ante contracting and on ex-post estimates would have given the same or very close results.

Notes

1 Economic Council of Canada, Intervention and Efficiency, Ottawa, November 1982 (EC 22-11).

2 In the United States, the situation is somewhat different as savings and loan associations are obliged to renew at current interest rates certain types of renegotiable and adjustable loans.

3 Disincentives to abandonment and default are much weaker for investors in income property. Accordingly, mortgage loans on income property are at higher rates of interest and lower LTV than loans for owner-occupied housing.

4 Canadian Federation of Independent Business, Banking and Small Business, A Comparative Study of Canada and Other Industrialized Countries, 1982, pp. 29-35.

5 Intervention and Efficienty, pp. 68-71 and 92-98.

6 Given the real rate of interest, equity accumulation is wholly paid for with monthly payments if the inflation premium incorporated in the mortgage interest rate is exactly equal to the rate of increase in the market price of the property. The borrower profits (or loses), makes real capital gains (losses), if the inflation premium is less (greater) than the rate of increase in the property's price.

7 For instance, one-quarter of the inflation adjustment could be capitalized and the remainder added to the real rate to determine the adjusted monthly payment. This option was considered and found to have adequate risk characteristics in Pouliot, Guérard Inc., Simulation of Various Mortgage Designs in Canada, paper prepared for the Ministerial Advisory Committee on Inflation and the Taxation of Personal Investment Income, September 30th, 1982.

8 The equalization of gross nominal income between indexed and other instruments is an important assumption of our simulations. It is not clear whether the Pouliot, Guérard Inc, simulations use a similar approach or whether they assume a 4 per cent real rate of interest on all indexed loans.

9 Intervention and Efficiency, 165-66.

10 For reviews of the foreign experience, see:

Kul B. Bhatia, "Index-Linking of Financial Contracts: A Survey of the State-of-the-Arts," University of Western Ontario Research Report No. 7412;

Albert Fishlow, "Indexing Brazilian Style: Inflation Without Tears?," Brookings Papers on Economic Activity, 1974, No. 1, 261-82;

OECD Committee on Financial Markets, Indexation of Fixed Interest Securities, 1973; Housing Finance, Present Problems, 1974; Flexibility in Housing Finance, 1975; Indexation of Financial Assets, 1975.

11 Rapport du Comité Consultatif sur l'inflation et l'imposition du revenu personnel de placements, Ottawa, September 30, 1982, Chapter 5.

12 William Stanley Jevons, Money and the Mechanism of Exchange, London, 1876, quoted by Thomas M. Humphrey, "The Concept of Indexation in the History of Economic Thought," in Federal Reserve Bank of New York, Federal Reserve Readings on Inflation, N.Y. 1979, 239-52.

13 United Kingdom, Committee on National Debt and Taxation (Colwyn Committee), Minutes of Evidence, London, 1927, Vol. 1, 278-7, cited by Humphreys, op. cit. The current real interest yield of U.K. Indexed gifts is about 3 per cent.

14 Alfred Marshall, "Reply to the Royal Commission on the Depression of Trade and Industry," 1886, reproduced in Official Papers by Alfred Marshall, London, 1926, 9-12, cited by Milton Friedman, "Monetary Correction," in Herbert Giersch et. al., Essays on Inflation and Indexation, American Enterprise Institute for Public Policy Research, Washington D.C., 1974, 25-62.

15 Walter Bagehot, "A New Standard of Value," The Economist, 20 November, 1975, cited by M. Friedman, op. cit.

16 Robert Giffen, "Fancy Monetary Standards," The Economic Journal, Vol. 2 (1892), 463-71, cited by M. Friedman, op. cit.

17 Stanley Fischer, "Indexing and Inflation," NBER Working Paper No. 670, May 1981.

18 David Levhari and Nissan Liviatan, "Government Intermediation and the Indexed Bond Market," American Economic Review, Vol. 66, No. 2 (May 1976), 186-92.

19 A. Rubner, "The Abdication of the Israeli Pound as a Standard of Measurement for Medium- and Long-Term Contracts," Review of Economic Studies, Vol. 28 (October 1960), 69-75.

20 Stanley Fischer, "The Demand for Index Bonds," Journal of Political Economy, Vol. 83, No. 3 (June 1975), 509-34.

21 Even if an "ideal" price index could be computed, "a single bond indexed on the ideal index is not the ideal indexed bond." (Stanley Fischer (1975)).

22 For a recent review of indexation initiated by borrowers, see Sally Hunt Streiter, "Indexed Bonds and Other Issues," Public Utilities fortnightly, June 10, 1982, 40-47.

23 J. Huston McCulloch, "Incentives and Proxies for Indexed Bond Issues: Reply," American Economic Review, Vol. 72, No. 3 (June 1982), 566-68.

24 John Bossons, "Indexation After the Lortie Report," University of Toronto Institute for Policy Analysis, Policy Study No. 82-7, December 1982, p. 26, fn. 16.

25 Ingemar Hansson, "Adjusting Income Taxes for Inflation," Skandinaviska Enskilda Banken Quarterly Review, No. 3, 1982, 80-84.

26 J. Huston McCulloch, "The Ban on Indexed Bonds, 1933-77," American Economic Review, Vol. 70, No. 5 (December 1980), 1018-21. The purpose of the German ban of index clauses seems to have been to assist currency reform, to speed the replacement of "cigarette money" by D-Marks. See Herbert Giersch, op. cit., p. 14.

27 Alan Blinder dubbed this a "National Inflation Mutual Fund" in his "Indexing the Economy Through Financial Intermediation," Carnegie-Rochester Conference, Pittsburgh, November 14-15, 1975.

28 Simulations have been made with initial 30 per cent and 20 per cent GDS, but only results with a 30 per cent GDS are shown in the charts.

Table 1

Term to Maturity of Conventional Loans,[1] 1961-1967

	1961	1962	1963	1964	1965	1966	1967
Lending Institutions	10.13	10.27	9.67	10.70	10.84	12.15	12.46
Corporations	5.70	6.20	6.31	6.86	6.54	6.87	6.49
Other Lenders	6.23	6.58	6.68	7.04	6.85	6.74	6.45

1 First, second, and other junior mortgages on new and existing property; government loans are excluded. The average term is weighted by the number of loans, not their amount.

Source CMHC, Canadian Housing Statistics, 1965 to 1968.

Table 2

Term to Maturity of New NHA Loans, in Per Cent of the Total Approved, 1971-1981

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1 Year	-	-	-	-	-	-	-	-	0.9	8.2	19.3
2 Years	-	-	-	-	-	-	-	-	-	0.9	3.6
3 Years	-	-	-	-	-	-	-	-	14.0	15.2	19.6
4 Years	-	-	-	-	-	-	-	-	0.1	0.3	-
5 Years	87.8	90.5	94.3	95.7	98.9	99.8	99.6	99.4	85.0	75.4	57.5
6 Years and Over	12.2	9.5	5.7	4.3	1.1	0.2	0.4	0.6	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source CMHC, Canadian Housing Statistics, several issues.

Table 3

Loan-to-Value Ratio - NHA Loans for New Dwellings - 1955-1981

	Total[1]	Approved Lenders
1955	71.8	--
1956	76.9	--
1957	74.1	--
1958	81.4	--
1959	79.6	--
1960	80.2	--
1961	86.6	--
1962	84.7	--
1963	85.0	--
1964	85.2	--
1965	85.3	--
1966	84.8	--
1967	79.3	--
1968	79.5	--
1969	85.1	--
1970	83.6	--
1971	85.8	82.9
1972	85.7	83.4
1973	85.4	84.5
1974	86.7	82.1
1975	91.3	87.0
1976	90.5	89.2
1977	90.3	90.0
1978	90.2	90.3
1979	93.4	93.4
1980	96.8	--

1 Includes approved lenders and CMHC loans.

Source CMHC, Canadian Housing Statistics, 1961-1980.

Table 4

GDS of NHA borrowers in the same real income bracket as the borrowers with average GDS in 1960[1]

	Total[2]	Approved Lenders
1946	15.2	-
1950	18.7	-
1954	18.4	-
55	18.7	-
56	19.1	-
57	20.2	-
58	21.2	-
59	21.7	-
1960	20.0	-
61	21.1	-
62	21.4	-
63	21.8	-
64	22.4	-
65	22.8	-
66	24.0	-
67	25.1	-
68	23.9	-
69	24.5	-
1970	24.3	-
71	23.2	23.6
72	23.3	23.9
73	24.2	24.4
74	-	26.1
75	-	30.1
76	-	33.2
77	-	34.1

1 Prior to 1968, data are based on income of borrower or purchaser only. Subsequent data are based on family income. Data subsequent to 1968 refer to single-detached dwellings only. Data for earlier periods include loans for single-detached, semi-detached and row dwellings, for owner-occupancy where each unit was financed by a separate loan. Excludes loans approved on lease-hold property.

2 Includes approved lenders and CMHC loans.

Source Canada Mortgage and Housing Corporation, Canadian Housing Statistics, 1957 to 1977.

Table 5

Comparison of Standard and Indexed Residential Mortgages[1]

Year	Standard mortgage: No inflation, 7% interest				Standard mortgage: 10% inflation, 17.7% interest				Fully indexed mortgage: 7% interest on capital indexed at 10%				
	PIT	GDS	Loan balance	Equity	PIT	GDS	Loan balance	Equity	PIT	GDS	Loan balance	House value	Equity
	(Dollars)	(Per cent)	(Dollars)	(Per cent)	(Dollars)	(Per cent)	(Dollars)	(Per cent)	(Dollars)	(Per cent)	(Dollars)	(Dollars)	(Per cent)
1	441	20 7	50,208	16 3	828	35.4	50,862	22.9	449	19 2	55,229	66,000	16 3
2	441	20 3	49,359	17 7	837	31 9	50,699	30 2	494	18 8	59,724	72,600	17 7
3	441	19 9	48,450	19 3	847	28 8	50,506	36 8	543	18 5	64,487	79,860	19 3
4	441	19 5	47,476	20 9	859	26 0	50,276	42.8	597	18 1	69,510	87,846	20 9
5	441	19 2	46,433	22 6	871	23.5	50,005	48.3	657	17 7	74,780	96,631	22 6
6	441	18 8	45,315	24 5	884	21 3	49,683	53.3	723	17 4	80,279	106,294	24 5
7	441	18 4	44,118	26 5	899	19 3	49,302	57 8	795	17 1	85,974	116,923	26 5
8	441	18 0	42,836	28 6	915	17 5	48,850	62 0	875	16 7	91,822	128,615	28 6
9	441	17 7	41,462	30 9	933	15 9	48,315	65 8	962	16 4	97,765	141,477	30 9
10	441	17 3	39,990	33 3	953	14 5	47,681	69 4	1,058	16 1	103,724	155,625	33 3
11	441	17 0	38,414	36 0	974	13 2	46,930	72 6	1,164	15 8	109,000	171,187	36 0
12	441	16 7	36,725	38 8	998	12 0	46,040	75 6	1,281	15 4	115,259	188,306	38 8
13	441	16 3	34,916	41 8	1,024	11 0	44,985	78.3	1,409	15 1	120,540	207,136	41.8
14	441	16 0	32,978	45 0	1,053	10 1	43,735	80.8	1,550	14 8	125,235	227,850	45 0
15	441	15 7	30,902	48 5	1,085	9 3	42,255	83 1	1,705	14 6	129,087	250,635	48.5
16	441	15 4	28,679	52 2	1,119	8.5	40,501	85 3	1,875	14 3	131,777	275,698	52 2
17	441	15 1	26,297	56 2	1,158	7.9	38,422	87.3	2,063	14 0	132,915	303,268	56 2
18	441	14 8	23,745	60 4	1,200	7 3	35,959	89 2	2,269	13.7	132,019	333,595	60 4
19	441	14 5	21,011	65 0	1,246	6.7	33,042	91 0	2,496	13 4	128,502	366,955	65 0
20	441	14 2	18,083	69 9	1,297	6.2	29,565	92.7	2,745	13.2	121,653	403,650	69 9
21	441	14 0	14,946	75 1	1,353	5.8	25,489	94 3	3,020	12 9	110,605	444,015	75.1
22	441	13 7	11,596	80 7	1,415	5.4	20,635	95.8	3,322	12.7	94,313	488,417	80.7
23	441	13 4	7,987	86 7	1,483	5.0	14,885	97 2	3,654	12 4	71,513	537,258	86.7
24	441	13 1	4,131	93 1	1,557	4.7	8,072	98 6	4,019	12 2	40,685	590,984	93 1
25	441	12.9	-	100 0	1 639	4 4	-	100 0	4,421	11.9		650,083	100 0

1 PIT is the monthly payment for principal, interest, and property taxes. GDS is the gross debt service ratio. These figures are based on the following assumptions: purchase price, $60,000; loan amount, $51,000; borrower's initial income, $25,000 per year; annual rate of real income growth, 2 per cent; initial property taxes, $1,000.

SOURCE: Economic Council of Canada

Table 6

House Prices[1] in Montreal and Toronto, 1971-1982

(Dollars)

	Montreal			Toronto		
	M.L.S.	No. 1	No. 2	M.L.S.	No. 1	No. 2
1971	23,693	-	-	31,822	-	-
1972	25,030	-	-	34,078	-	-
1973	26,385	-	-	44,105	-	-
1974	33,368	38,000	90,000	56,121	67,000	92,000
1975	35,467	32,000	90,000	58,181	64,000	88,000
1976	39,783	32,000	100,000	62,805	69,000	89,000
1977	42,455	29,835	98,000	67,015	66,667	87,666
1978	46,006	30,000	97,000	68,913	68,750	89,000
1979	51,644	34,250	109,000	73,992	70,500	92,000
1980	54,654	39,250	131,000	80,032	76,000	98,500
1981	-	54,000	202,500	-	90,500	114,500
1982[2]	-	54,500	210,000	-	101,100	130,750

[1] Multiple Listing (MLS) prices are averages for all property sold through the MLS service. House Nos. 1 and 2 are as defined in the Royal Trust Survey. The Montreal houses are in Pierrefonds (No. 1) and Mount Royal (No. 2). The Toronto houses are both in Mississauga.

[2] March 1982.

Source Canadian Real Estate Association, Annual Report, 1980; Royal Trust Corporation, Survey of Canadian House Prices, October, 1973 to October, 1982.

Table 7

House Prices, Consumer Prices and Wages, by City, 1974-1982

	Halifax	Montreal	Ottawa	Toronto	Regina	Vancouver
			House No. 1 Price (dollars)			
April 1974	45,000	38,000	52,000	67,000	33,000	48,000
April 1978	54,950	30,000	62,400	68,750	55,750	53,500
March 1982	110,000	54,500	78,150	101,100	79,000	95,000
			Per Cent Increase, April 1974 to March 1982			
House Price	114	43	50	51	139	98
CPI	104	109	102	110	111	111
Wages	134	142	141	125	166	143
			House No. 2 Price (dollars)			
August 1974	68,000	90,000	72,000	92,000	69,000	65,000
April 1978	95,500	97,000	89,725	89,000	87,250	70,000
March 1982	175,000	210,000	124,500	130,750	129,000	135,000
			Per Cent Increase, August 1974 to March 1982			
House Price	157	133	73	42	87	108
CPI	96	100	95	100	103	100
Wages	123	129	127	115	148	125

Sources Statistics Canada, CANSIM data bank, and Royal Trust Corporation, Survey of Canadian House Prices.

Table 8

Initial Annual Income, House Price and Taxes, for Various Cities
(Dollars)

	House #1 (April 1974)			House #2 (August 1974)		
	Minimum Income[1]	House Price	Taxes	Minimum Income	House Price	Taxes
Halifax	17,912	45,000	1,050	28,615	68,000	1,500
Quebec	13,722	34,000	850	-	-	-
Montreal	15,004	38,000	850	35,922	90,000	1,400
Ottawa	19,237	52,000	775	28,006	72,000	900
Toronto	23,291	67,000	550	34,950	92,000	900
Regina	12,569	33,000	600	26,796	69,000	850
Vancouver	17,373	48,000	600	24,907	65,000	700

1 Annual income necessary to qualify for an 85 per cent LTV loan at the conventional rate with 25-year amortization.

Source Economic Council of Canada calculation based on Royal Trust Survey house prices and property taxes.

Table 9

Assumed Real Rate of Interest on Indexed Loans for House No. 1, April 1974[1]

Index	Halifax	Montreal	Ottawa	Toronto	Regina	Vancouver
			(Per cent)			
Local CPI	2.4	2.3	2.4	2.3	1.8	2.2
Local Wages	-	-0.2	-	-	-2.0	-0.2
House Price	5.9	12.6	7.3	10.1	0.4	8.5

1 See the Appendix for the derivation of the real rate.

Source Economic Council of Canada.

Chart 1 - Conventional Mortgage Interest Rate and Inflation Rate - Canada, 1952-1981

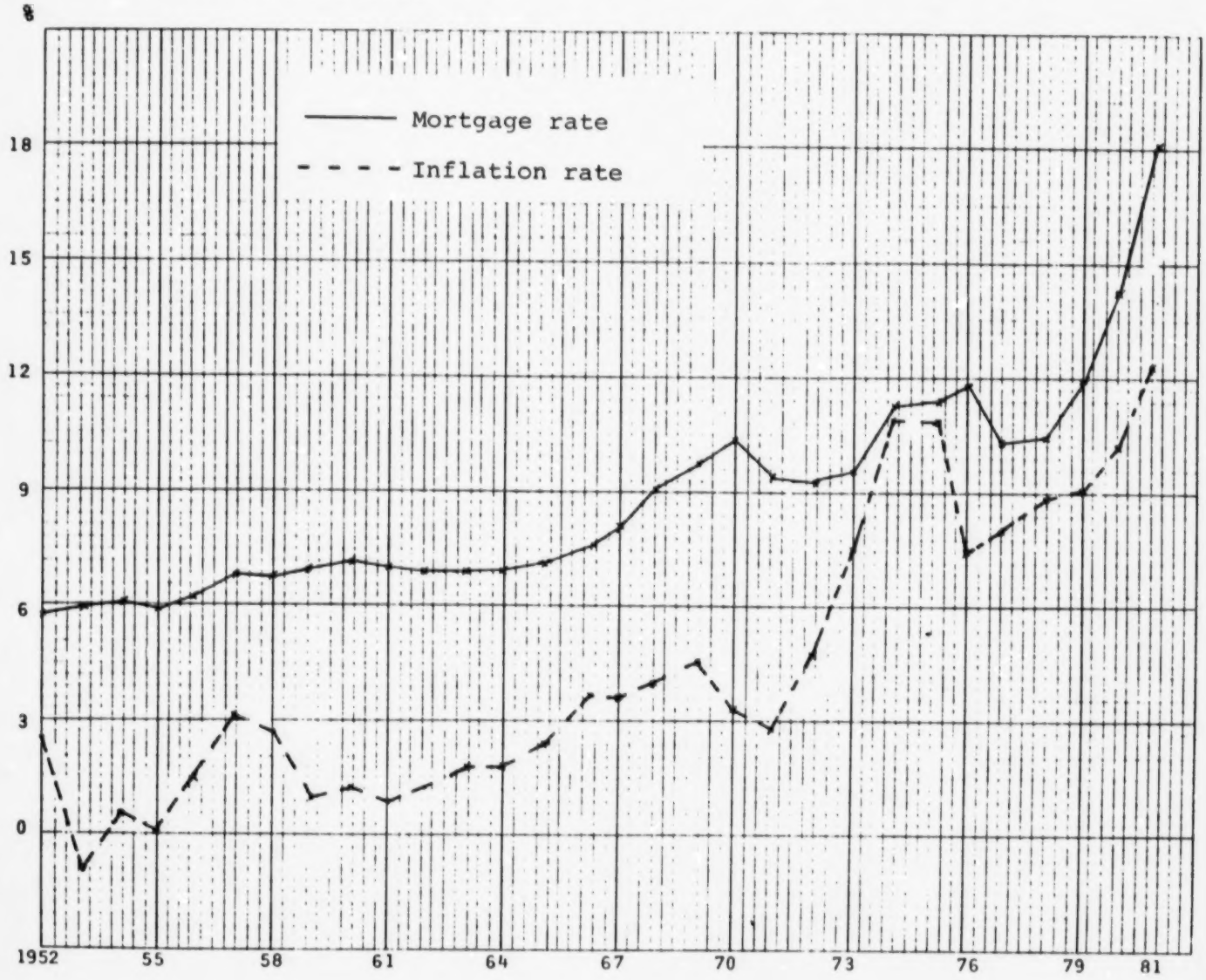


Chart 2 - GDS - Standard (S) 5-Year Term Versus CPI Indexed (I) Mortgage - Regina - House No. 1 - April 1974 - March 1982

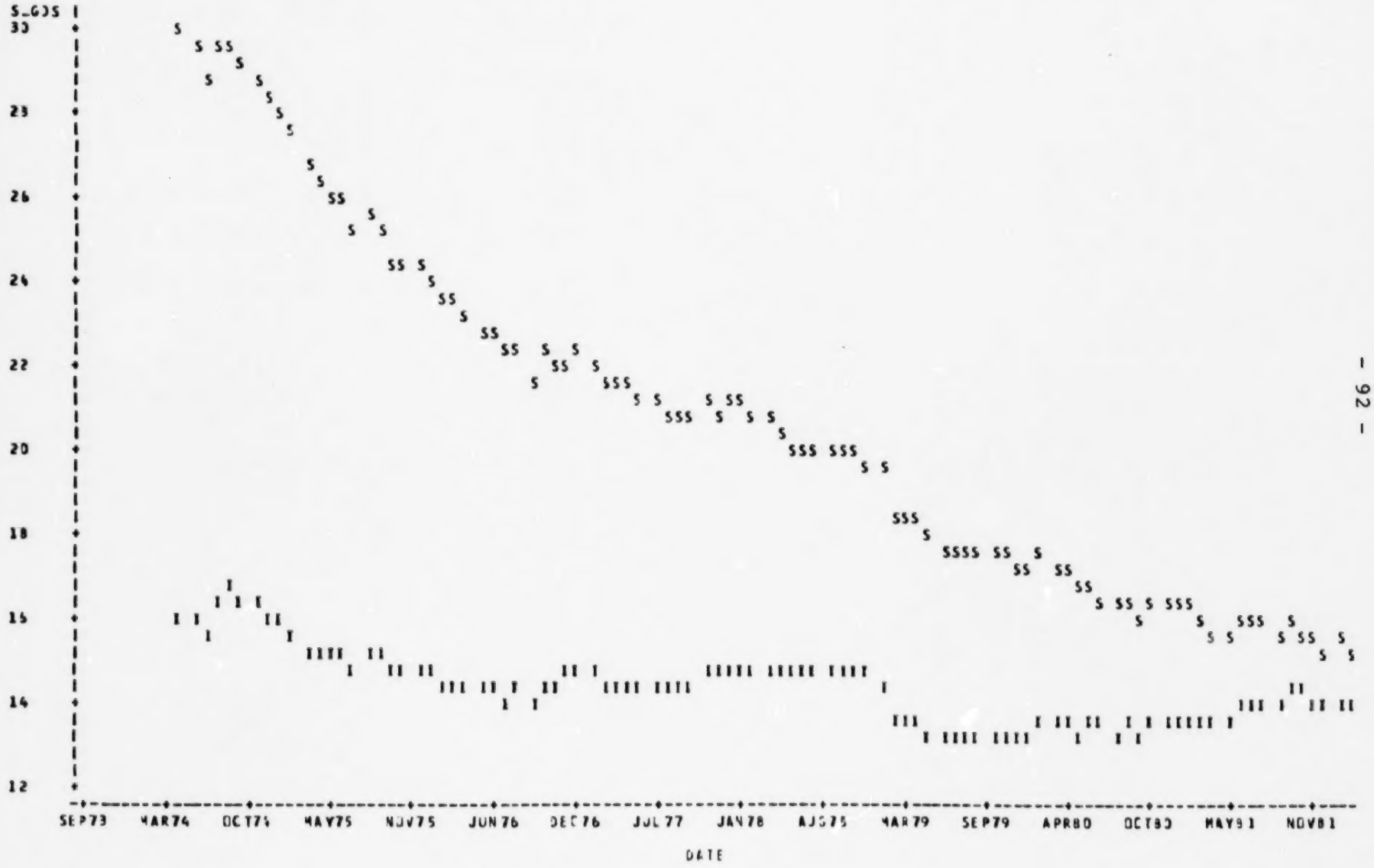


Chart 3 - GDS - Standard (S) 5-Year Term Versus CPI Indexed (I)
Mortgage - Montreal - House No. 1 - April 1974 - March 1982

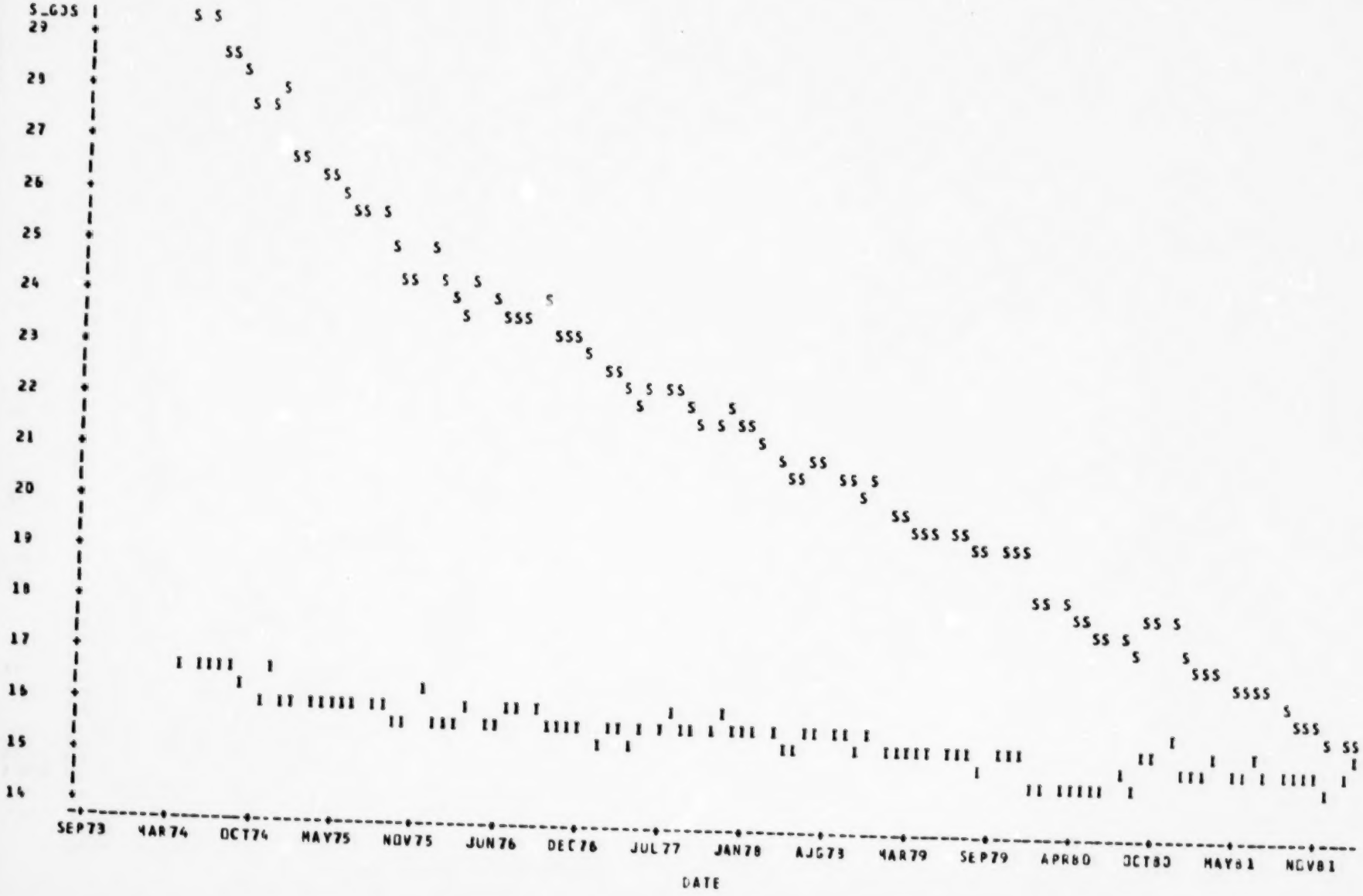


Chart 4 - GDS - Standard (S) 5-Year Term Versus CPI Indexed (I)
Mortgage - Vancouver - House No. 1 - April 1974 - March 1982

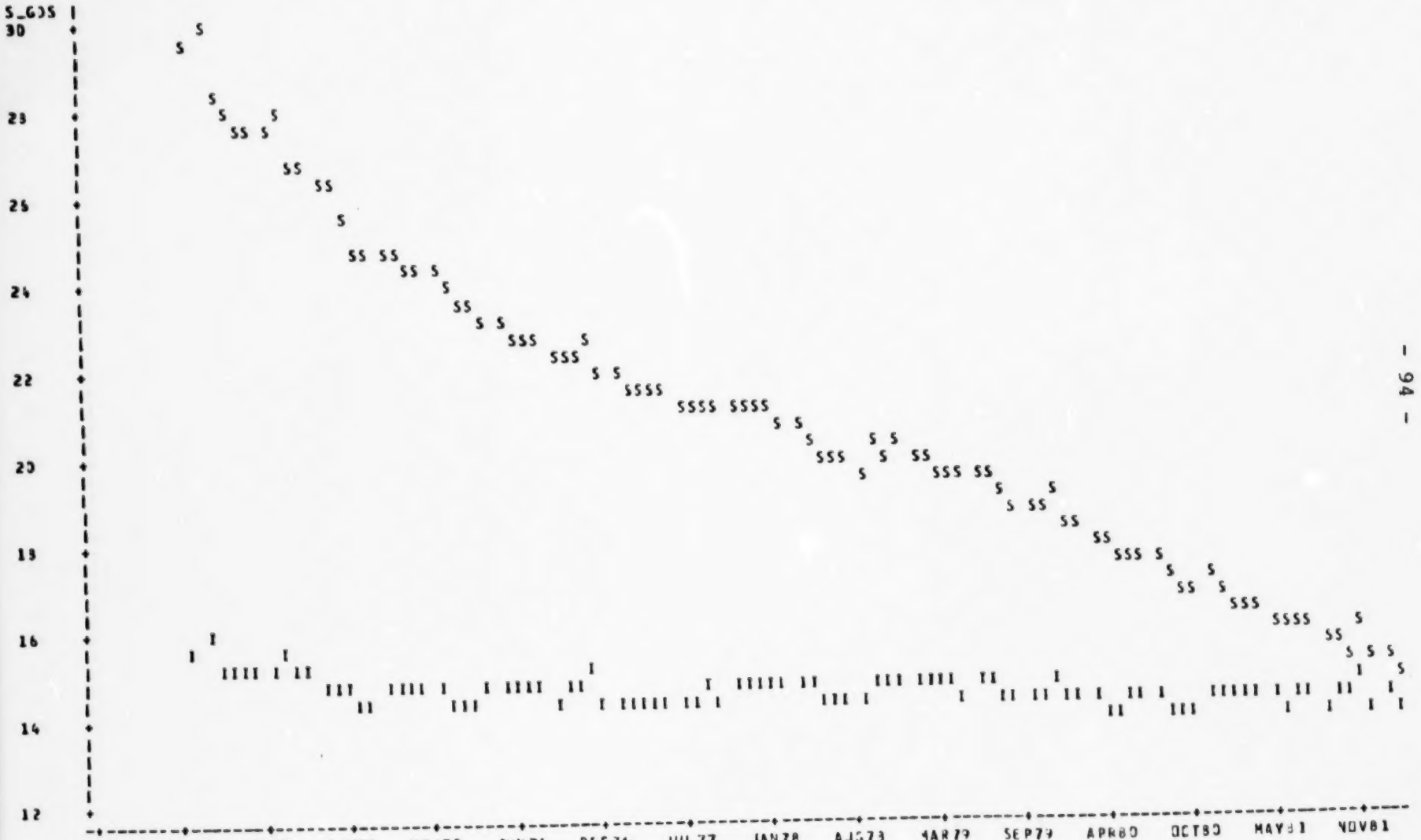


Chart 5 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage - Regina - House No. 1 - April 1974 - April 1982

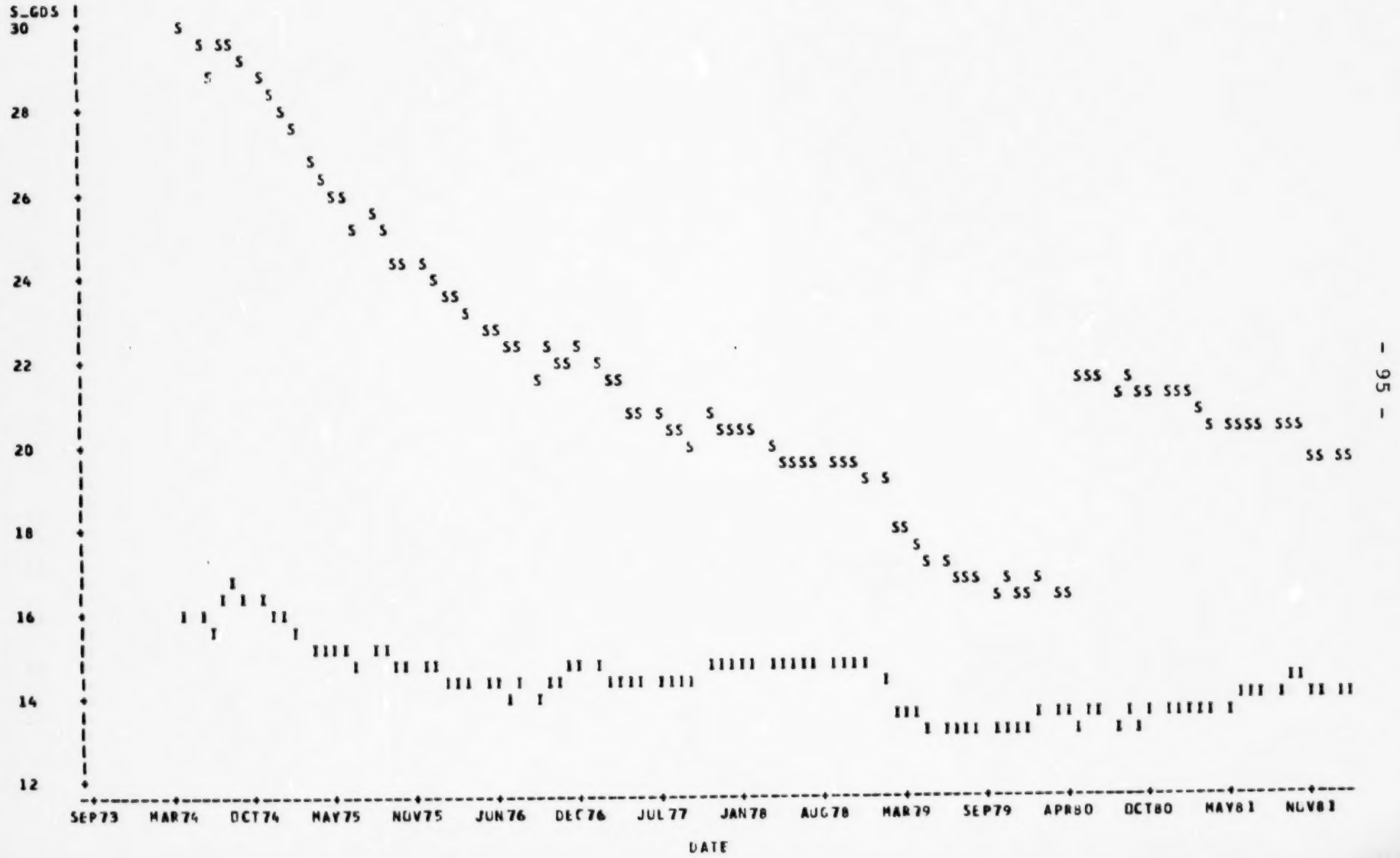


Chart 6 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Montreal - House No. 1 - April 1974 - March 1982

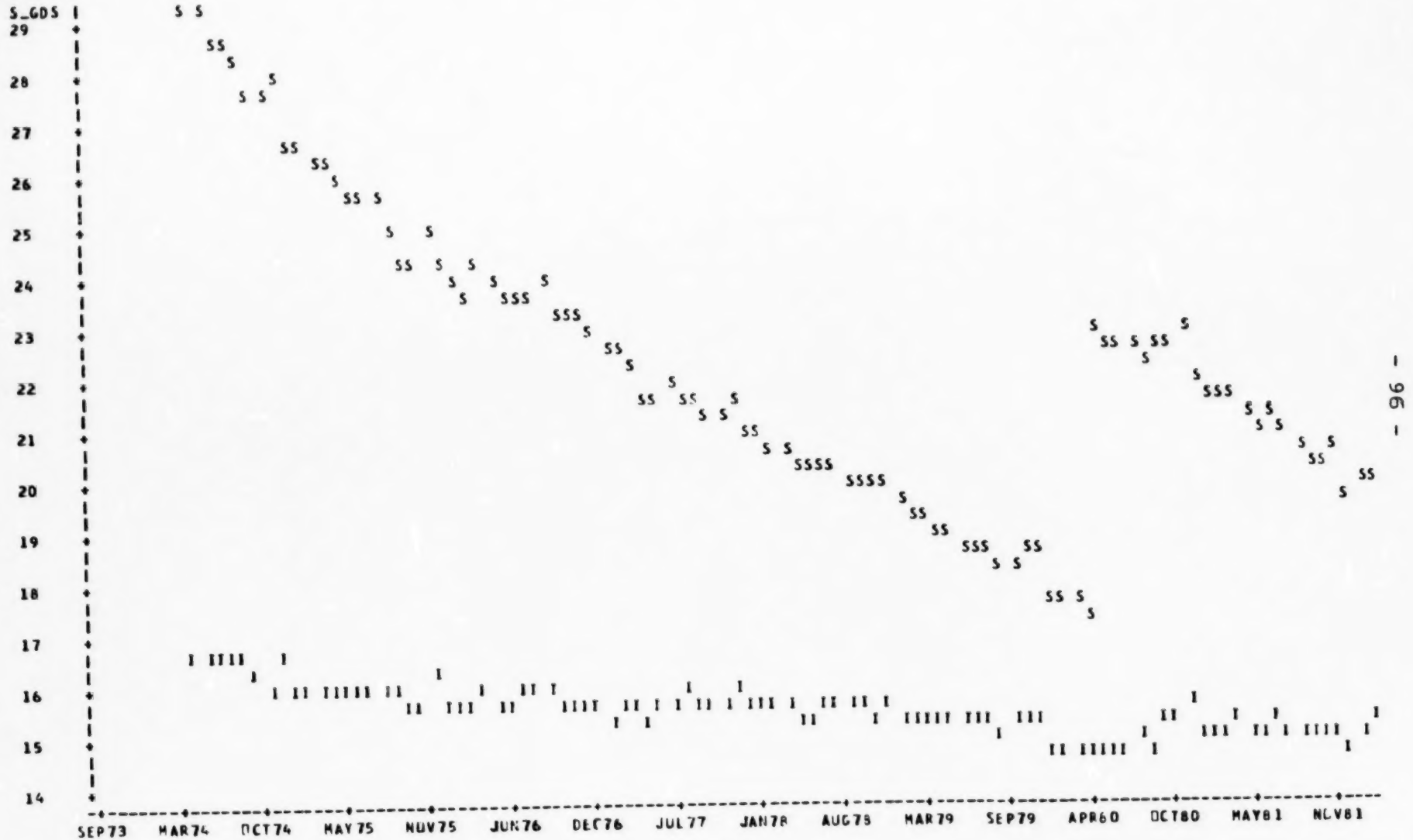


Chart 7 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage - Vancouver - House No. 1 - April 1974 - March 1982

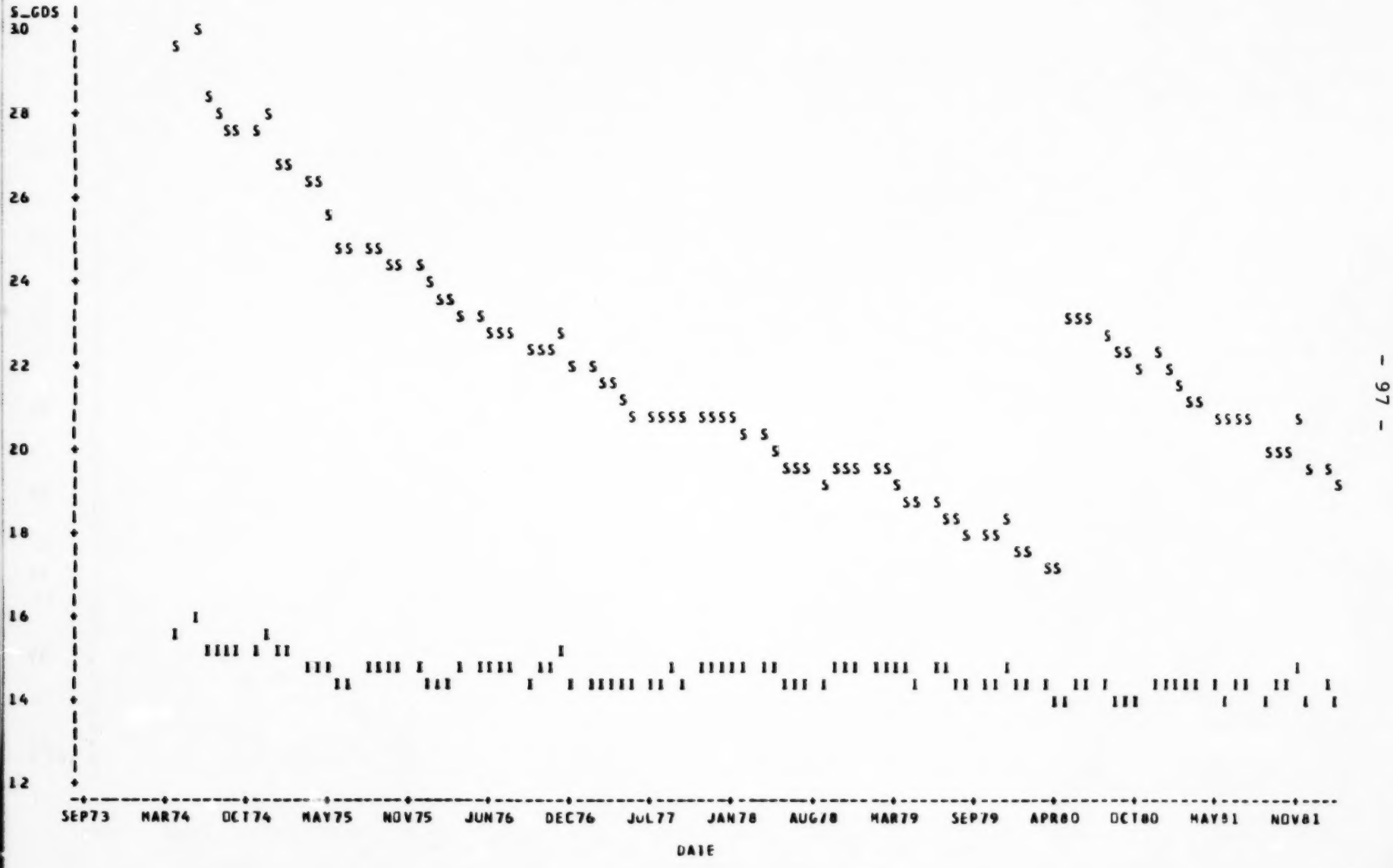


Chart 8 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Halifax - House No. 1 - April 1974 - March 1982

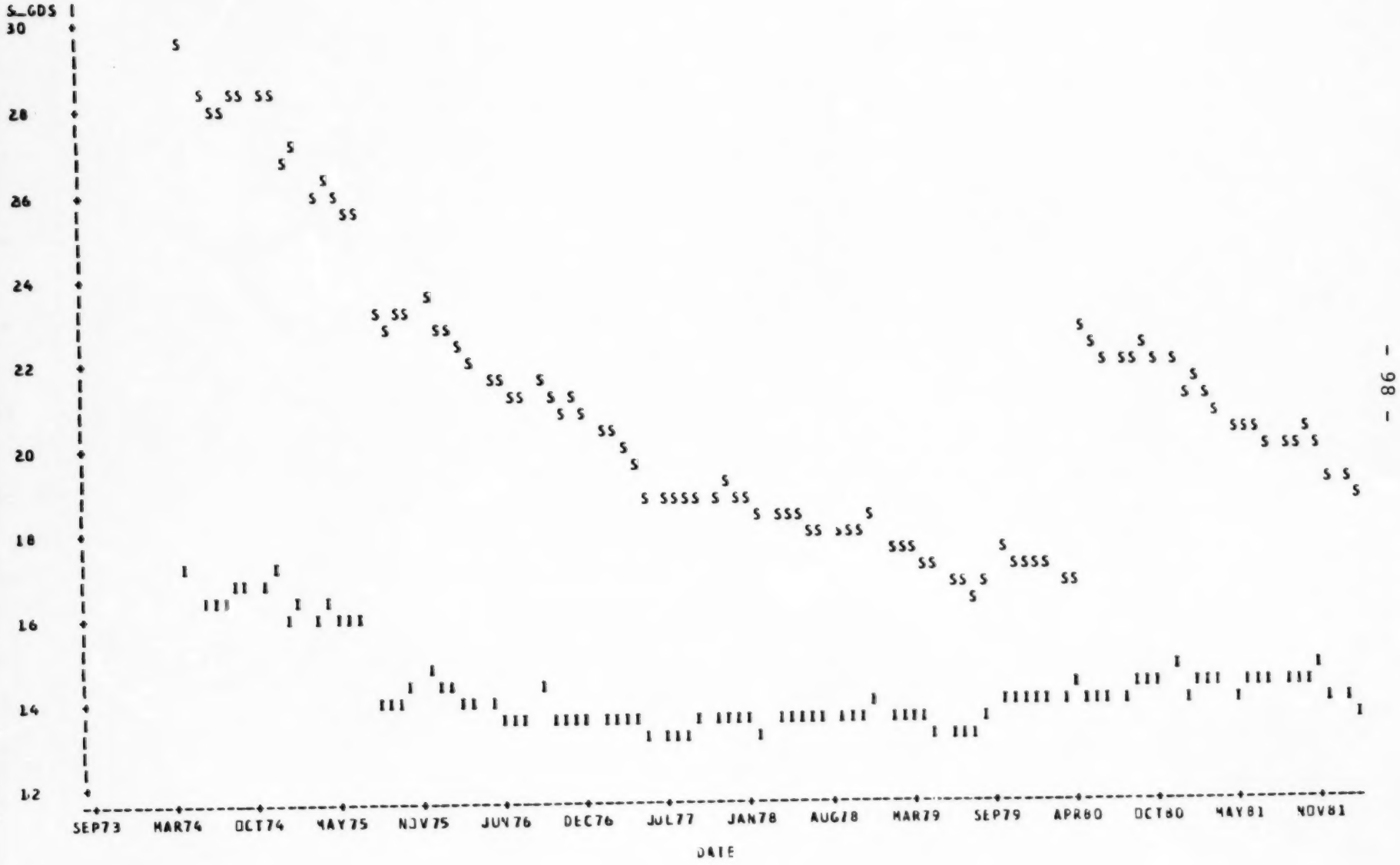


Chart 9 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Ottawa - House No. 1 - April 1974 - March 1982

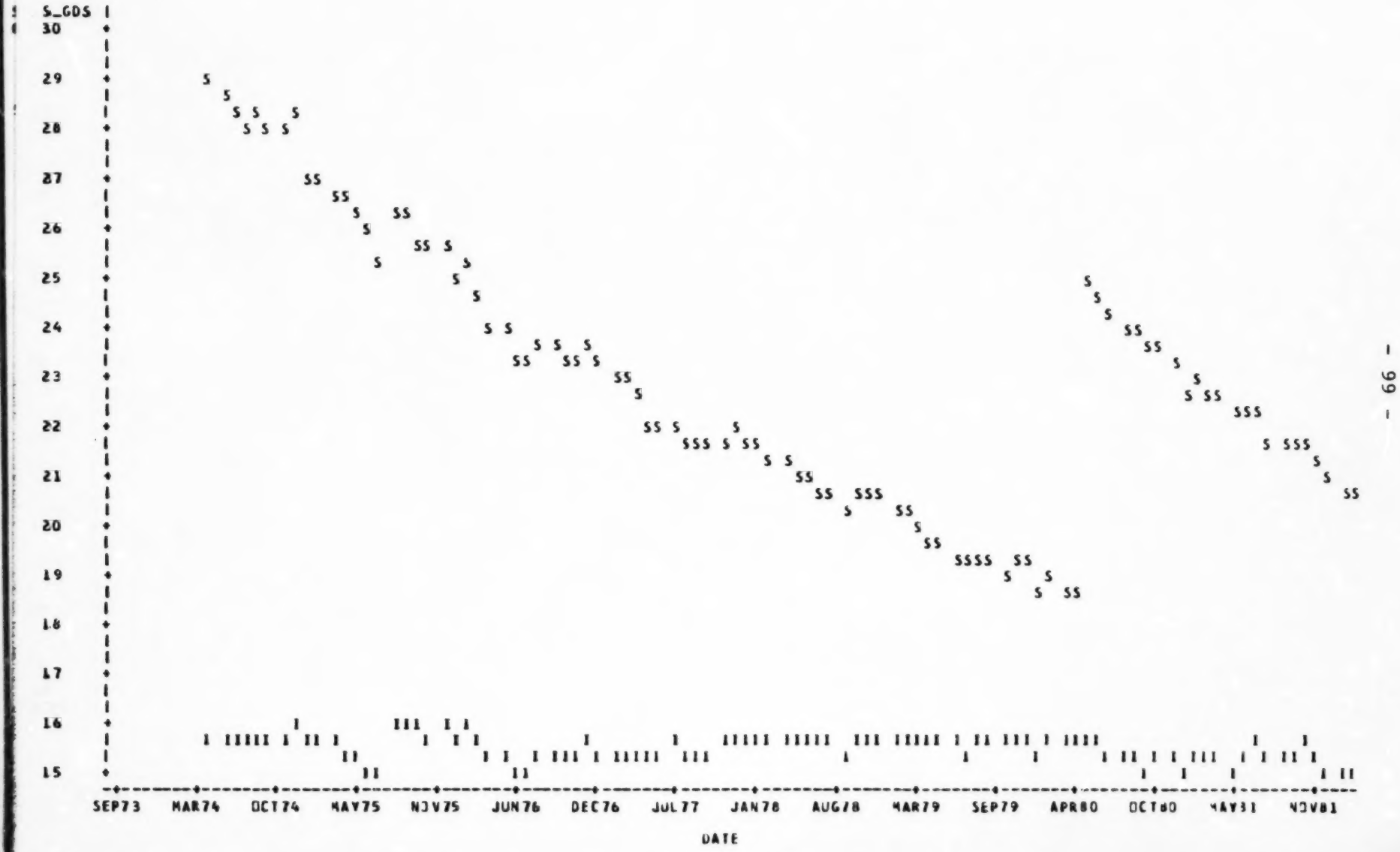


Chart 10 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Toronto - House No. 1 - April 1974 - May 1982

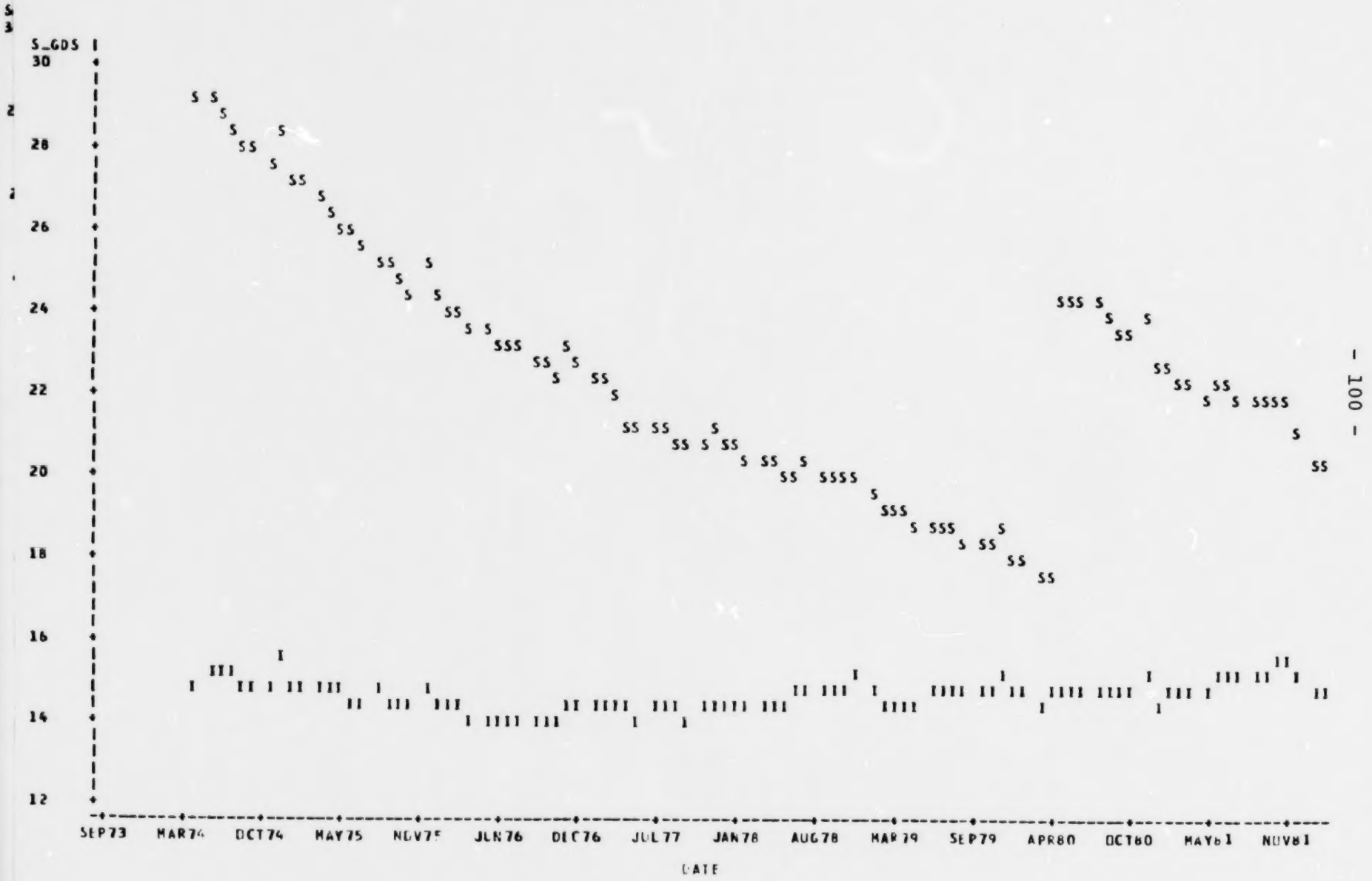


Chart 11 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Quebec - House No. 1 - April 1974 - May 1982

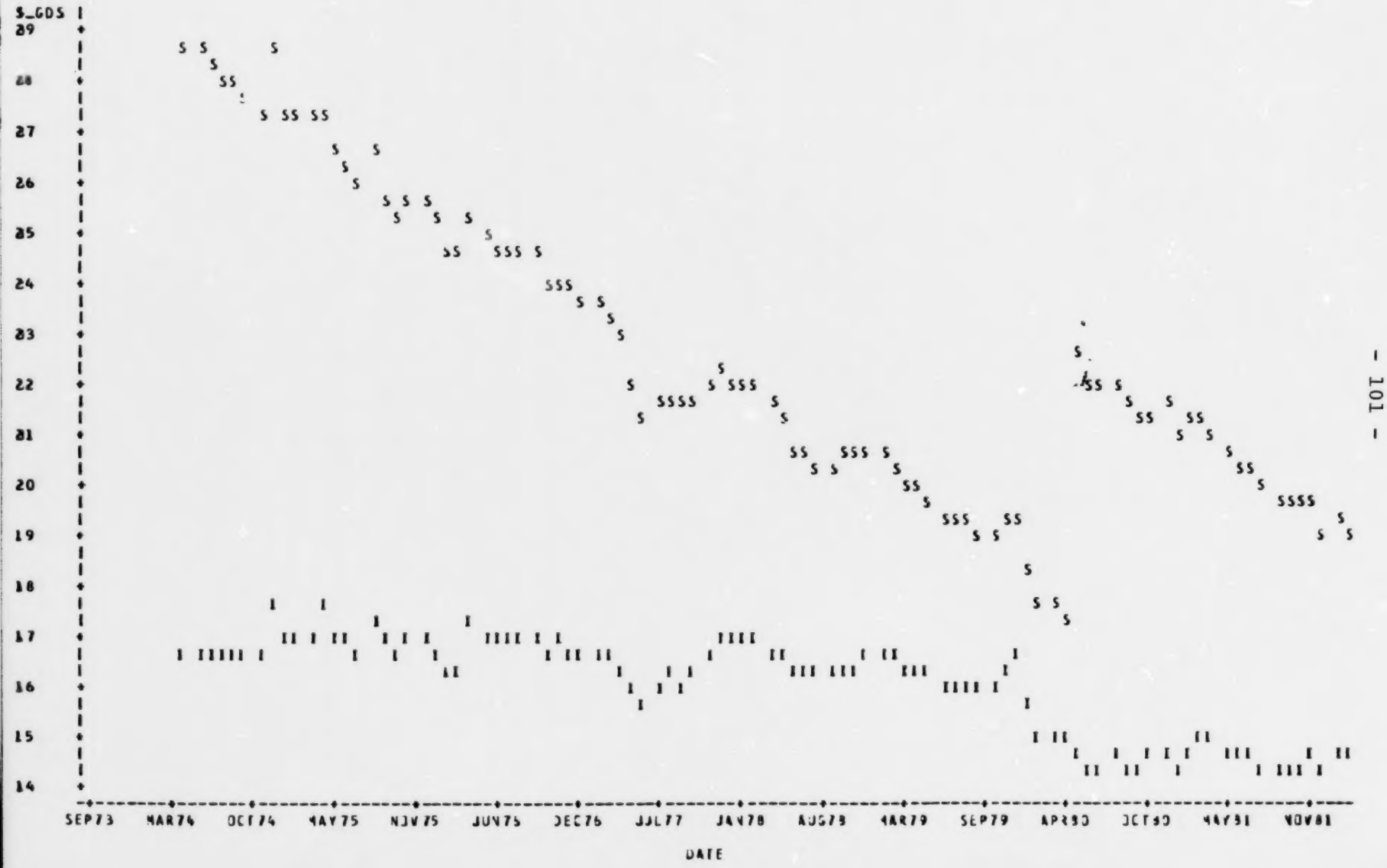


Chart 12 - Equity - Standard (S) 5-Year Term Versus CPI Indexed (I) Mortgage - Regina - House No. 1 - April 1974 - March 1982

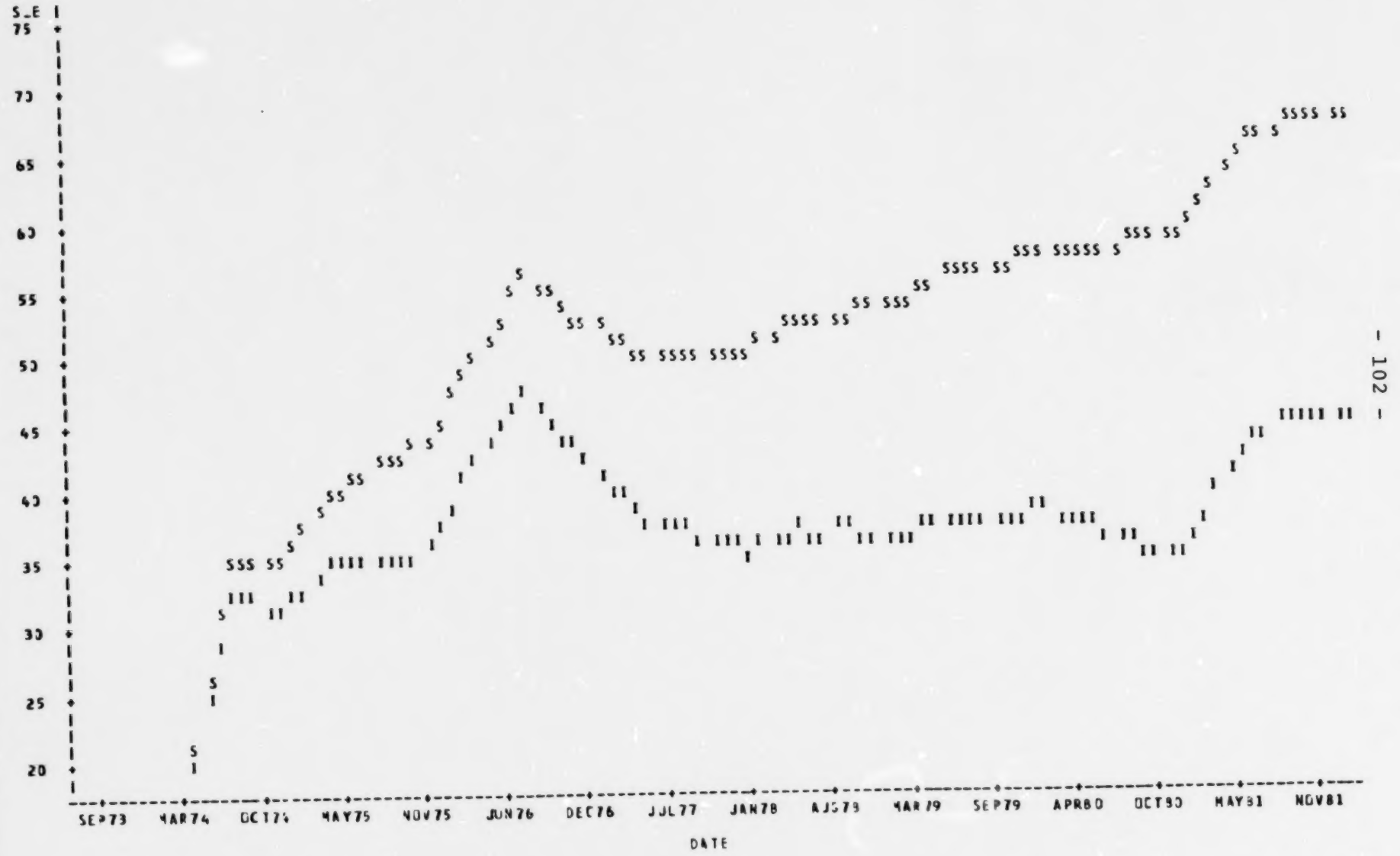


Chart 13 - Equity - Standard (S) 5-Year Term Versus CPI Indexed (I) Mortgage - Montreal - House No. 1 - April 1974 - March 1982

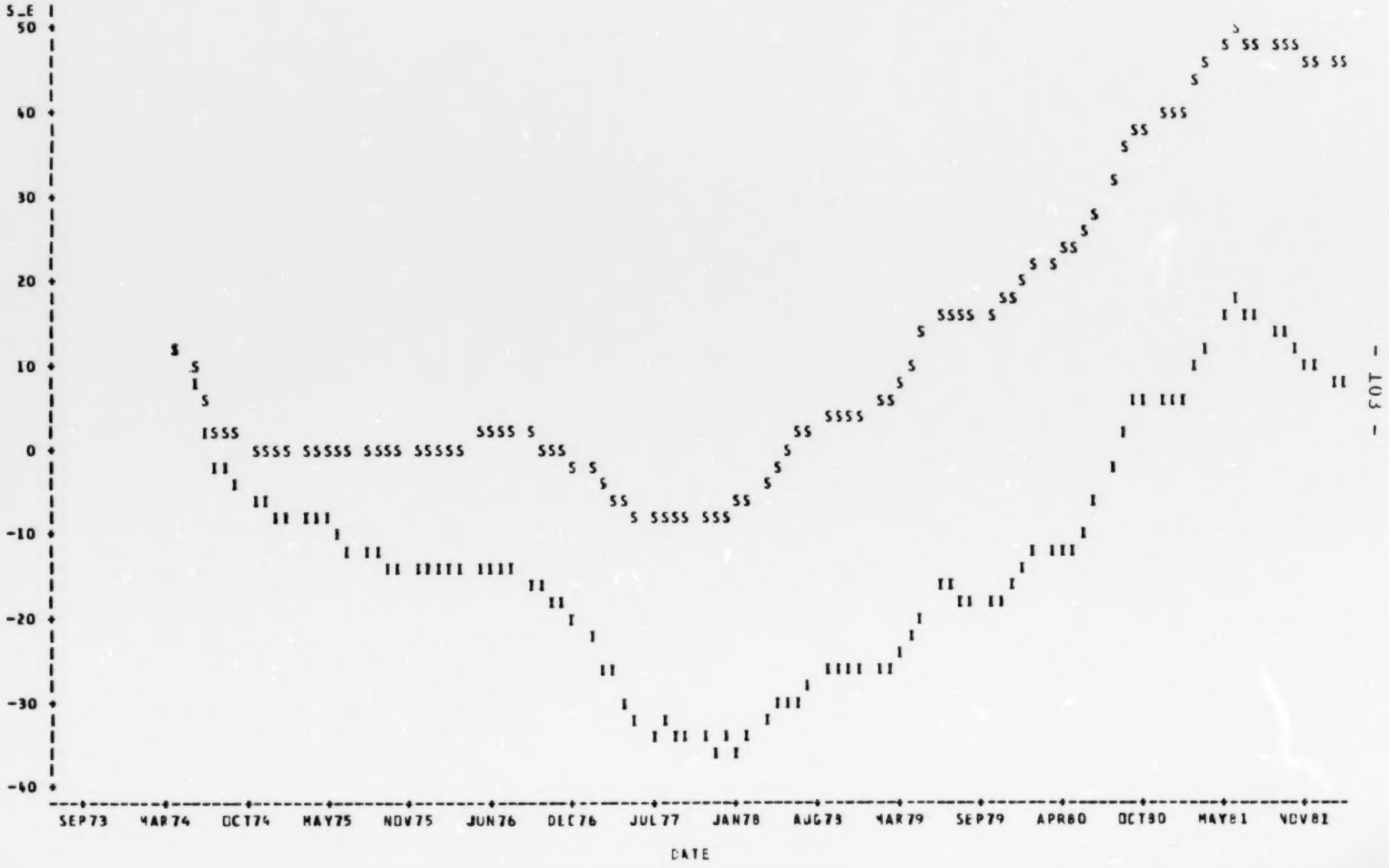


Chart 14 - Equity - Standard (S) 5-Year Term Versus CPI Indexed (I) Mortgage - Vancouver - House No. 1 - April 1974 - March 1982

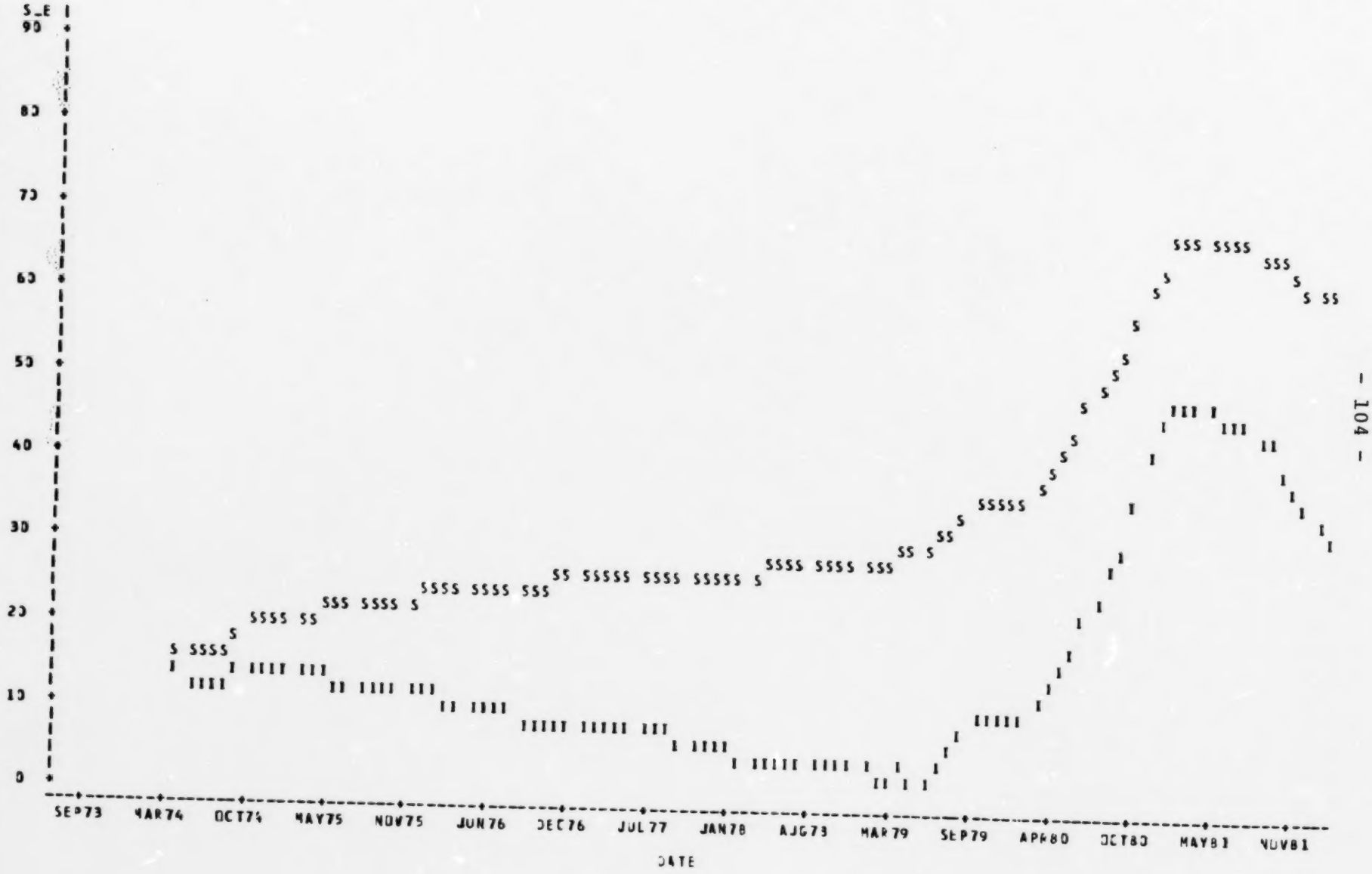


Chart 15 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Regina - House No. 1 - April 1974 - March 1982

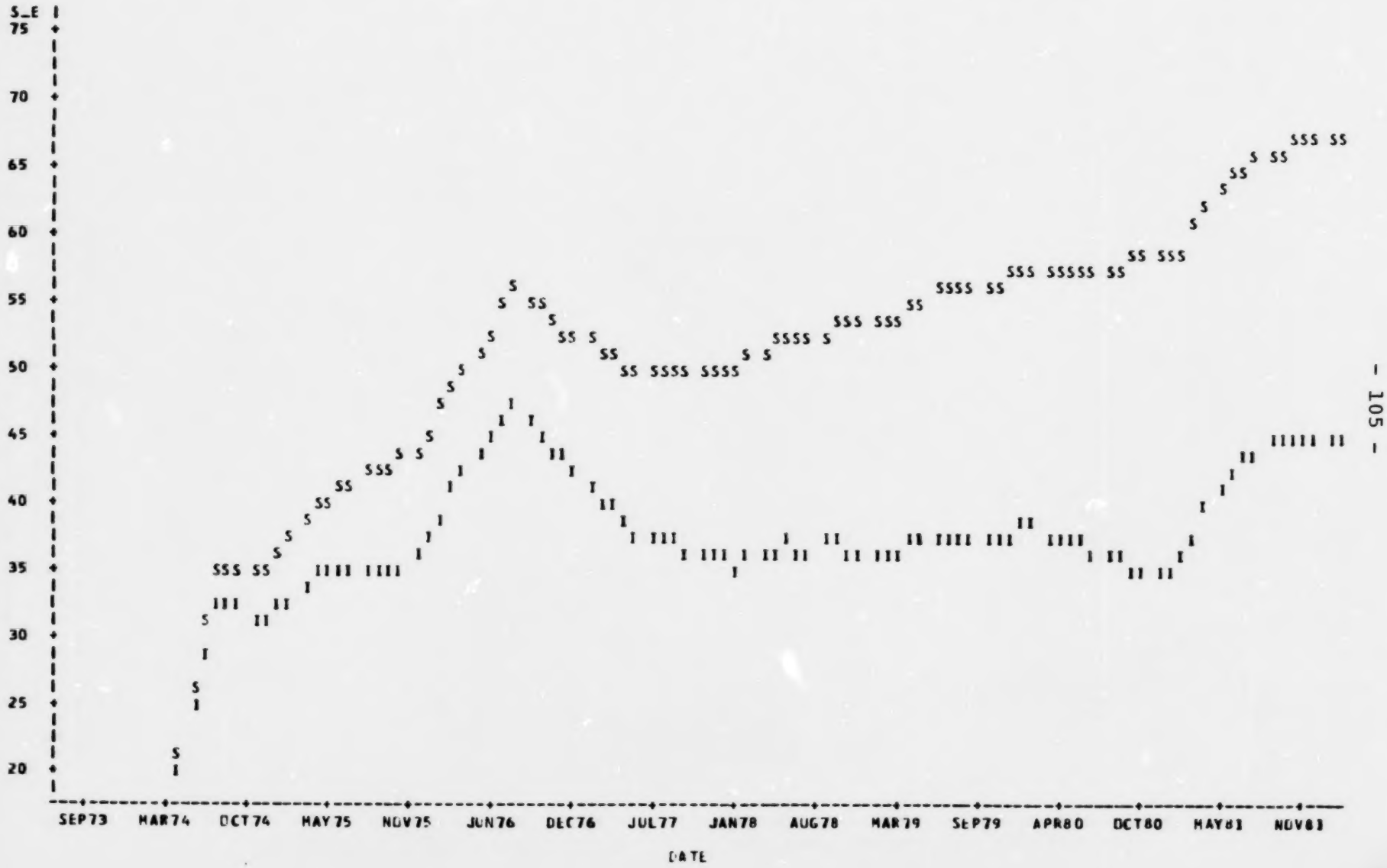


Chart 16 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage - Montreal - House No. 1 - April 1974 - March 1982

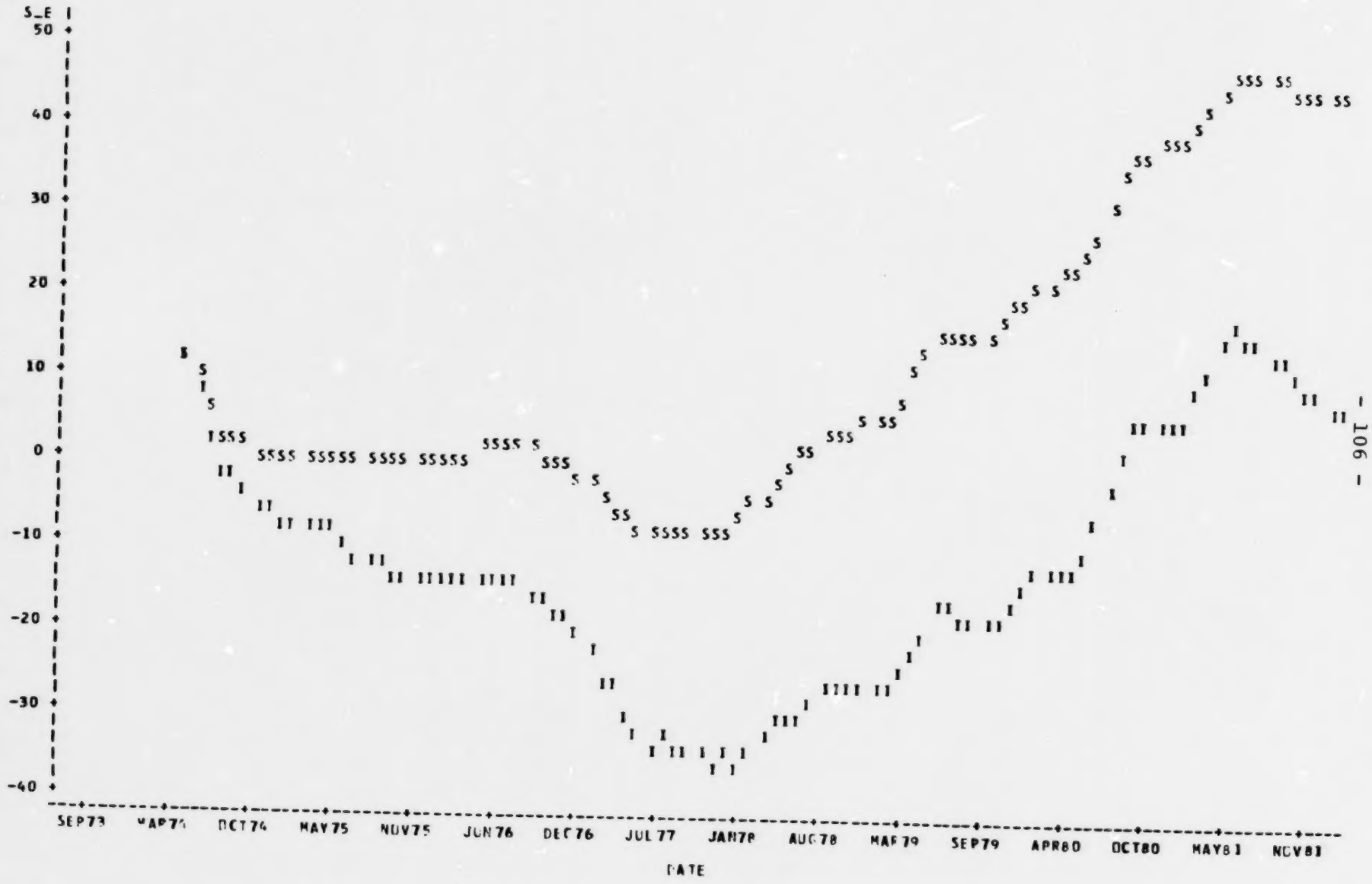


Chart 17 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Vancouver - House No. 1 - April 1974 - March 1982

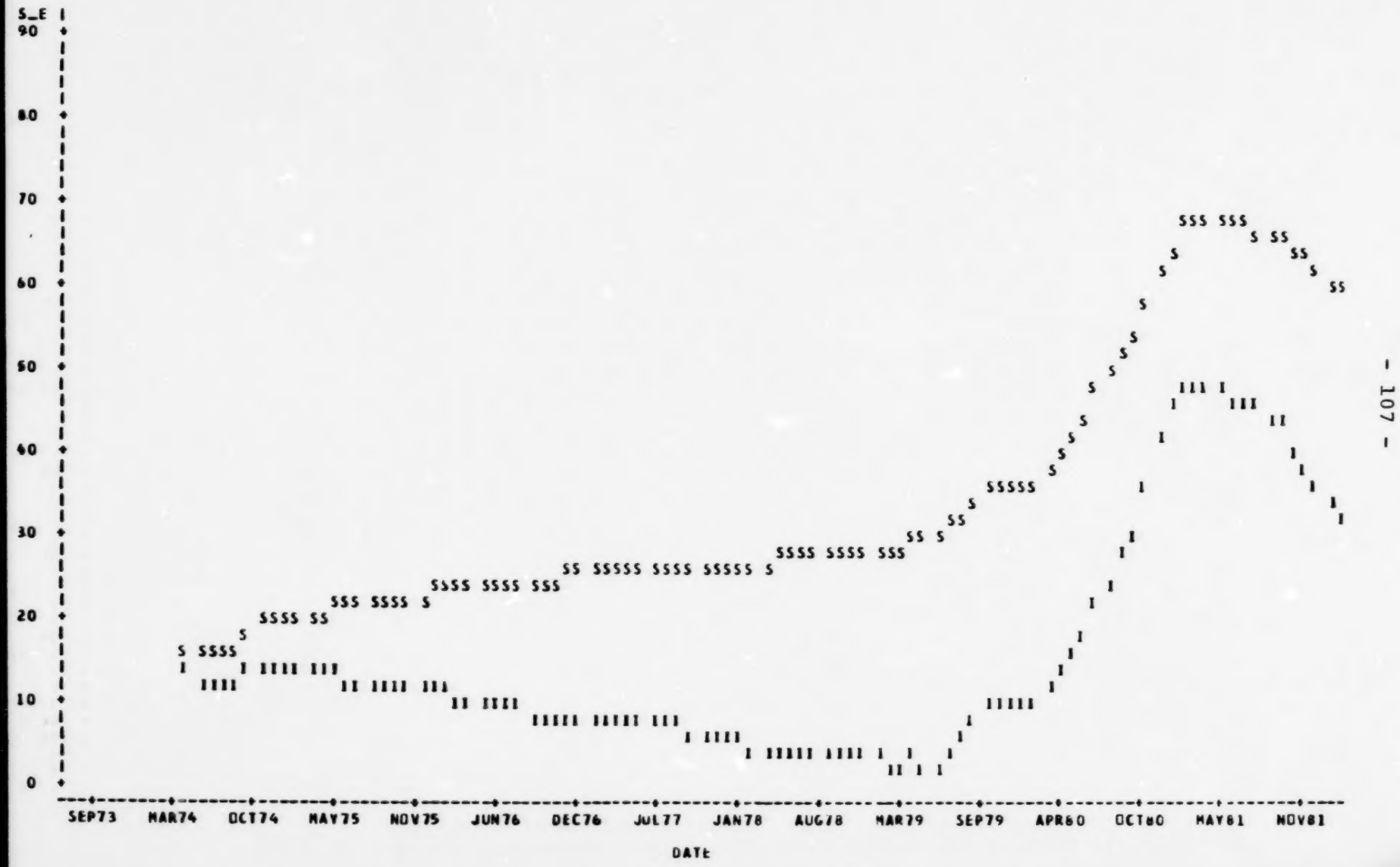


Chart 18 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Halifax - House No. 1 - April 1974 - March 1982

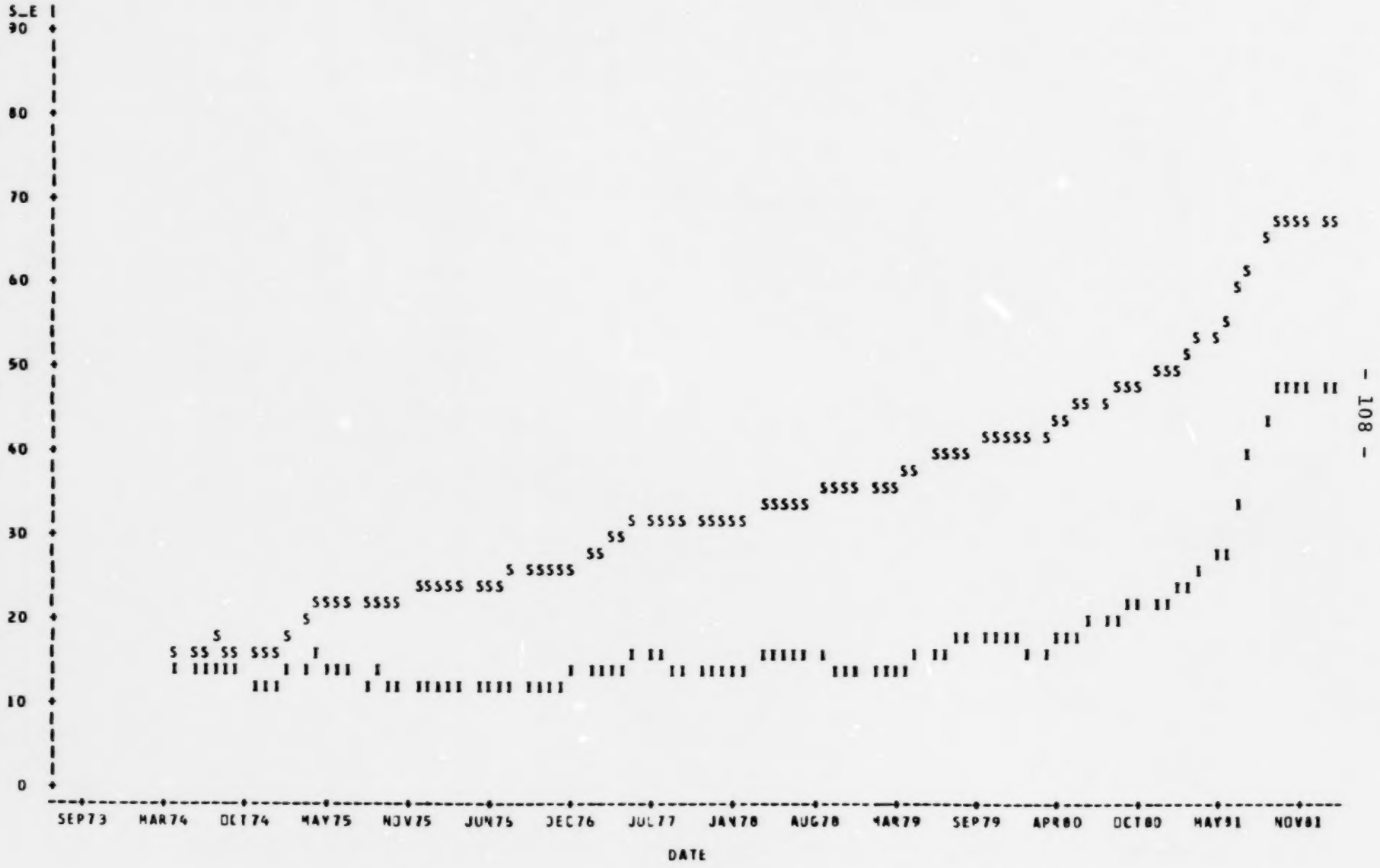


Chart 19 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Ottawa, House No. 1 - April 1974 - March 1982

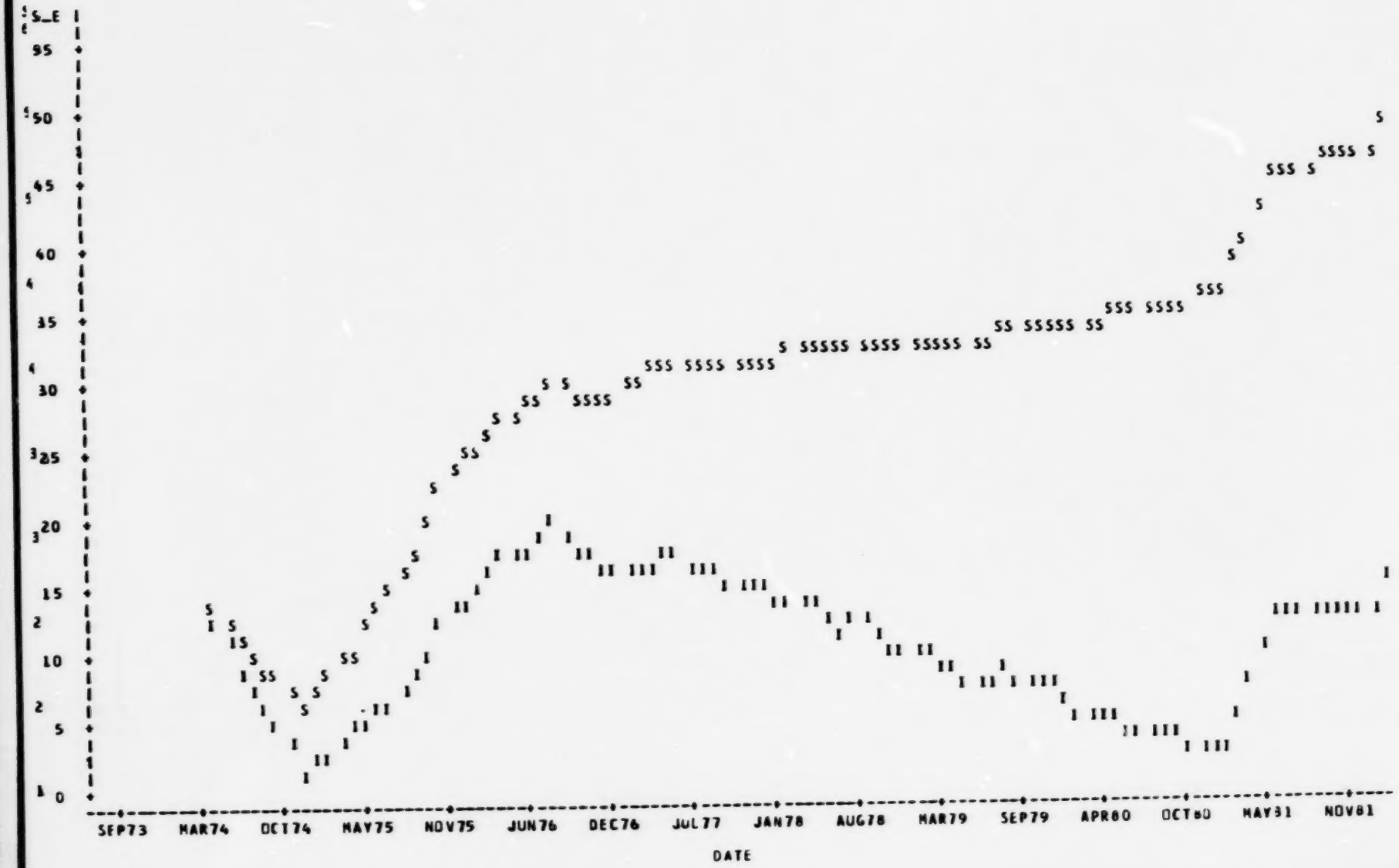


Chart 20 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage - Toronto - House No. 1 - April 1974 - March 1982

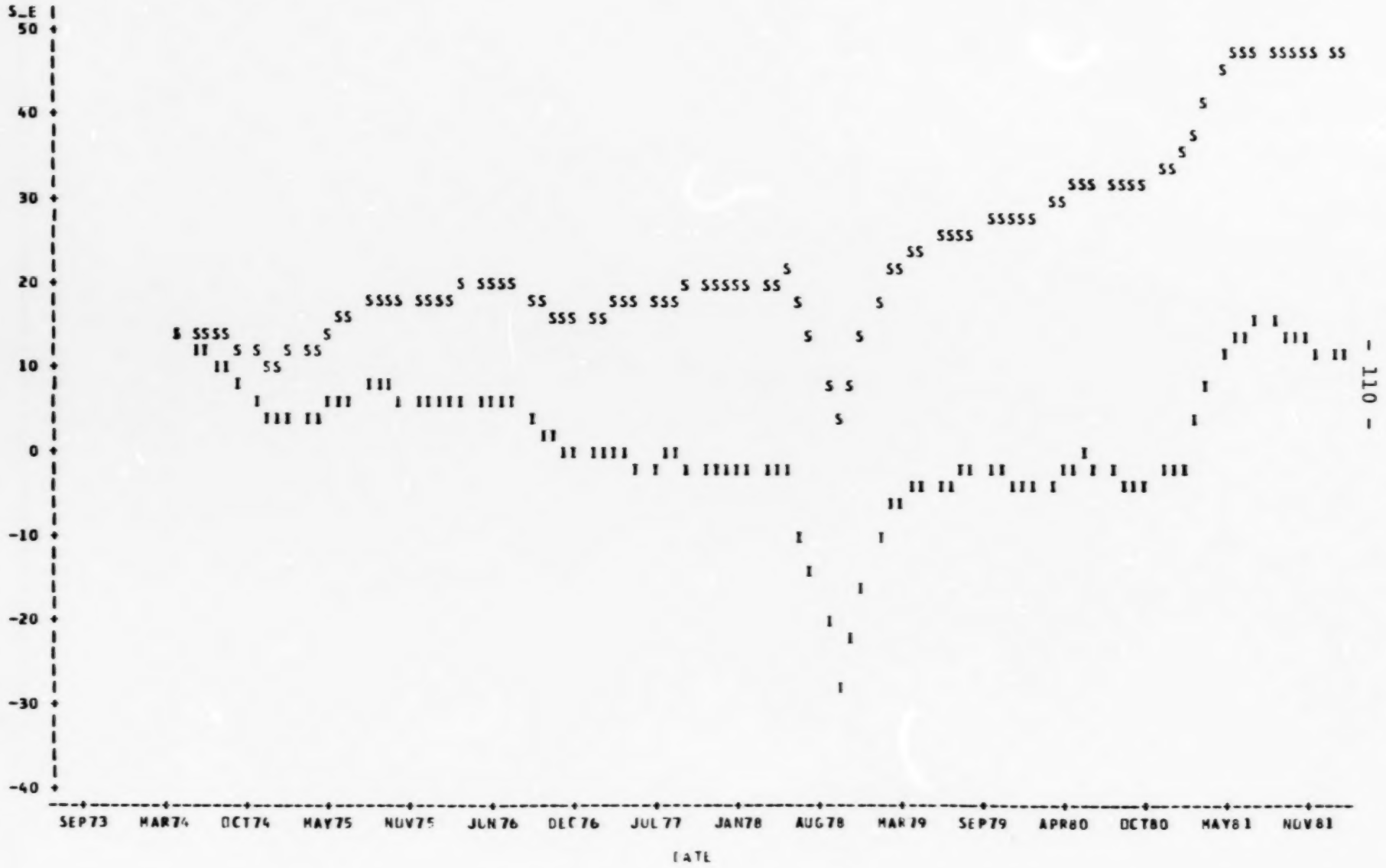


Chart 21 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage, Quebec - House No. 1 - April 1974 - March 1982

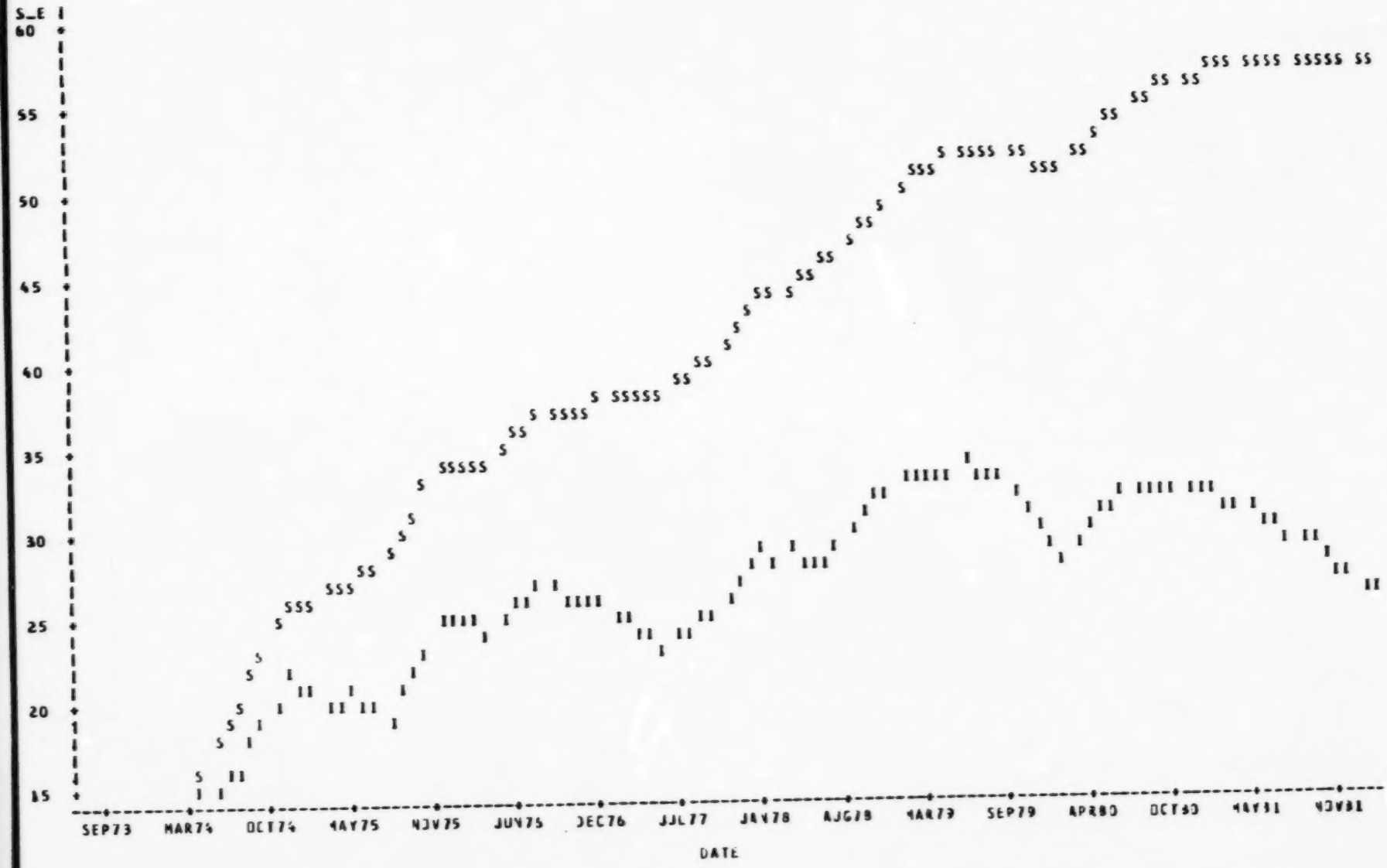


Chart 22 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Montreal - House No. 2 - August 1974 - March 1982

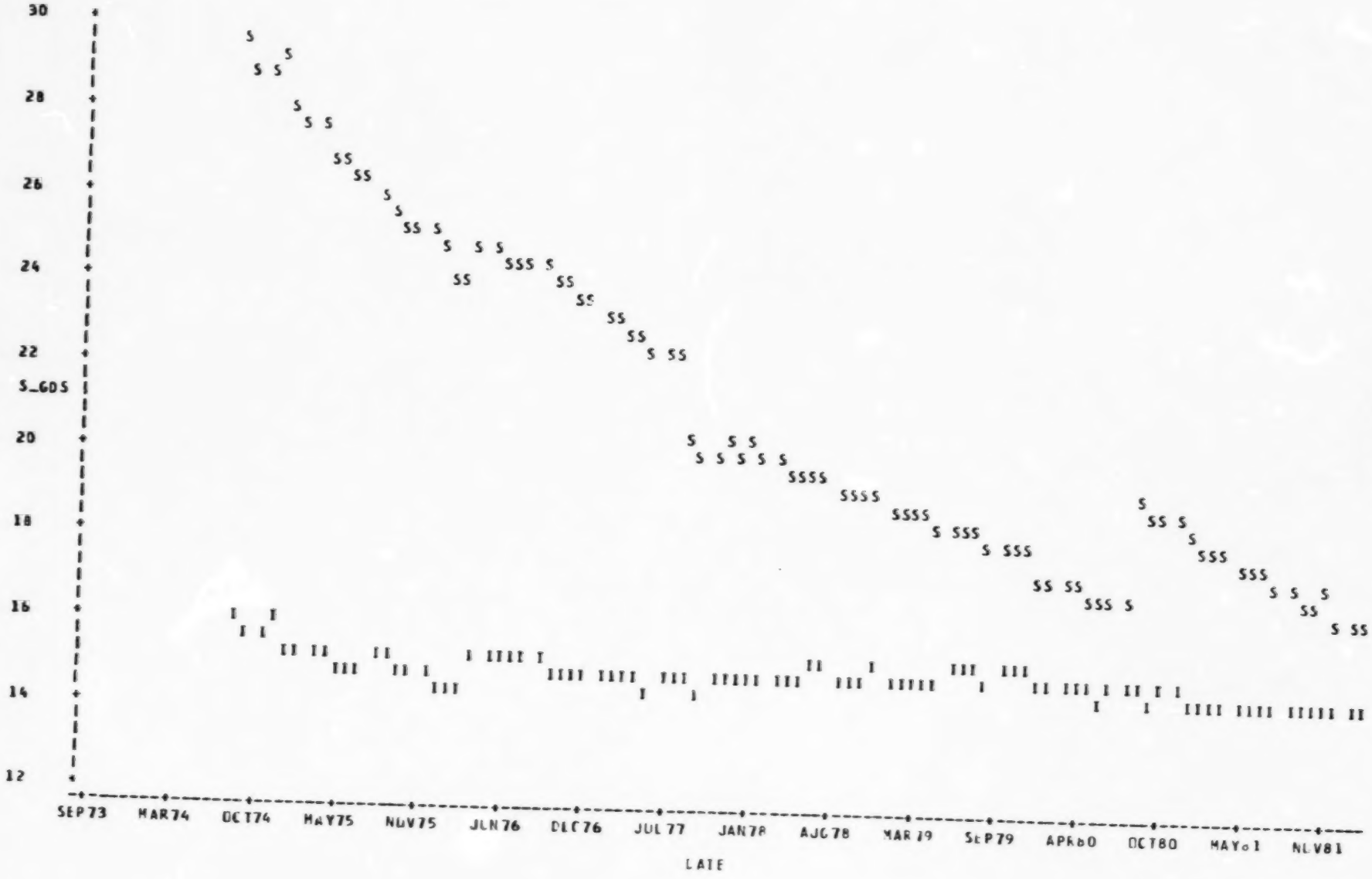


Chart 23 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Vancouver - House No. 2 - August 1974 - March 1982

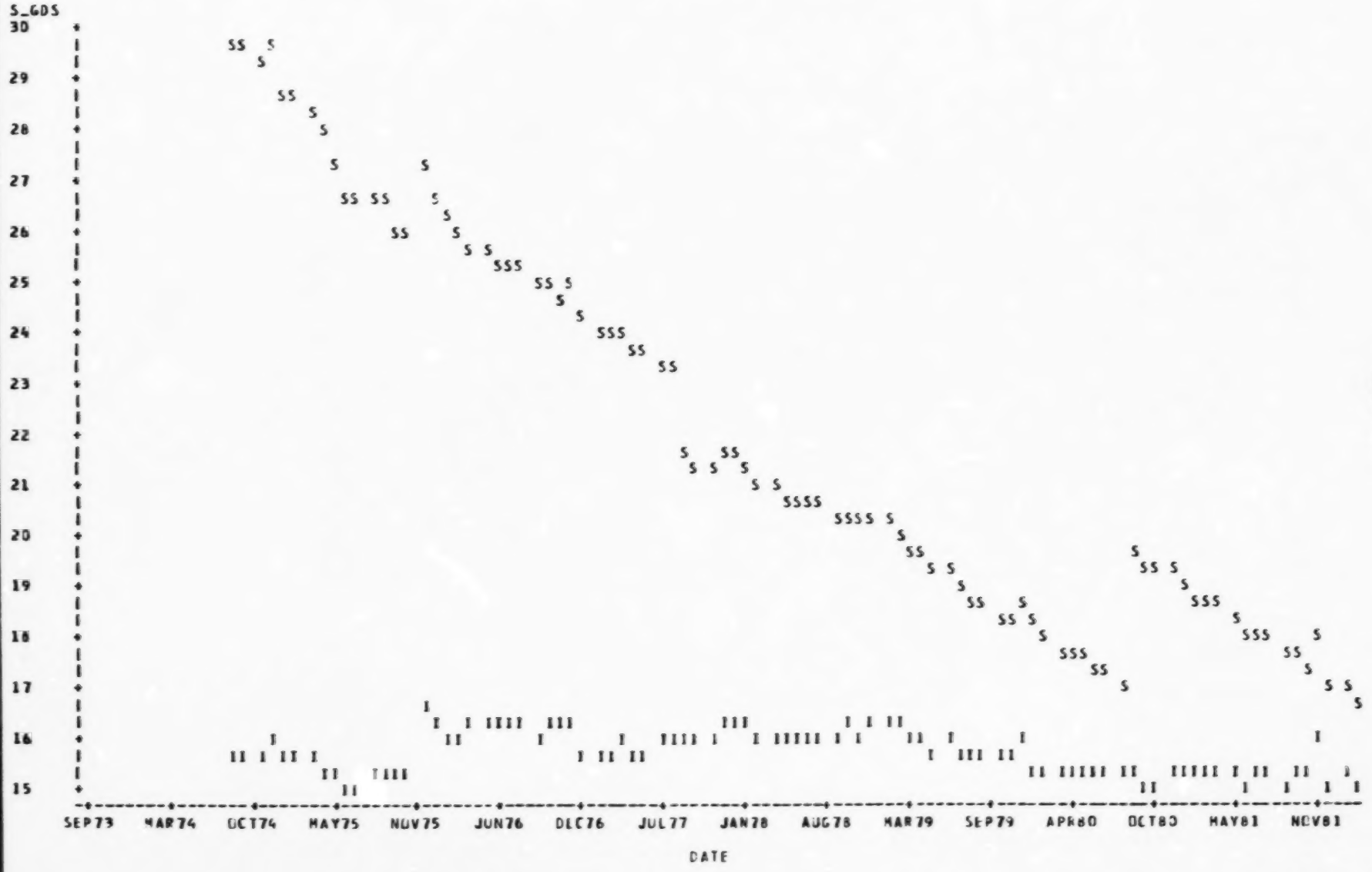


Chart 24 - GDS - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Halifax - House No. 2 - August 1974 - March 1982

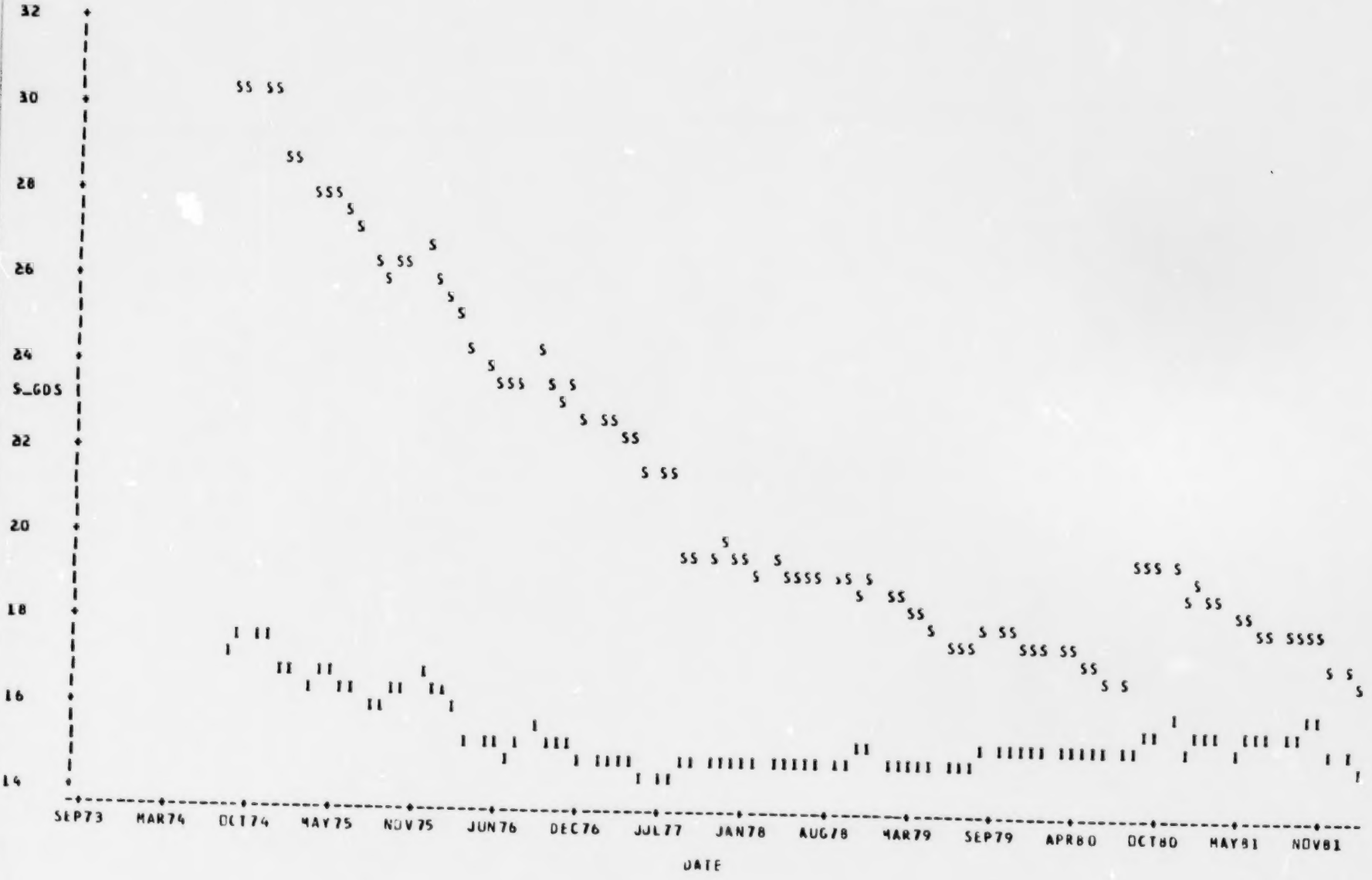


Chart 25 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage - Montreal - House No. 2 - August 1974 - March 1982

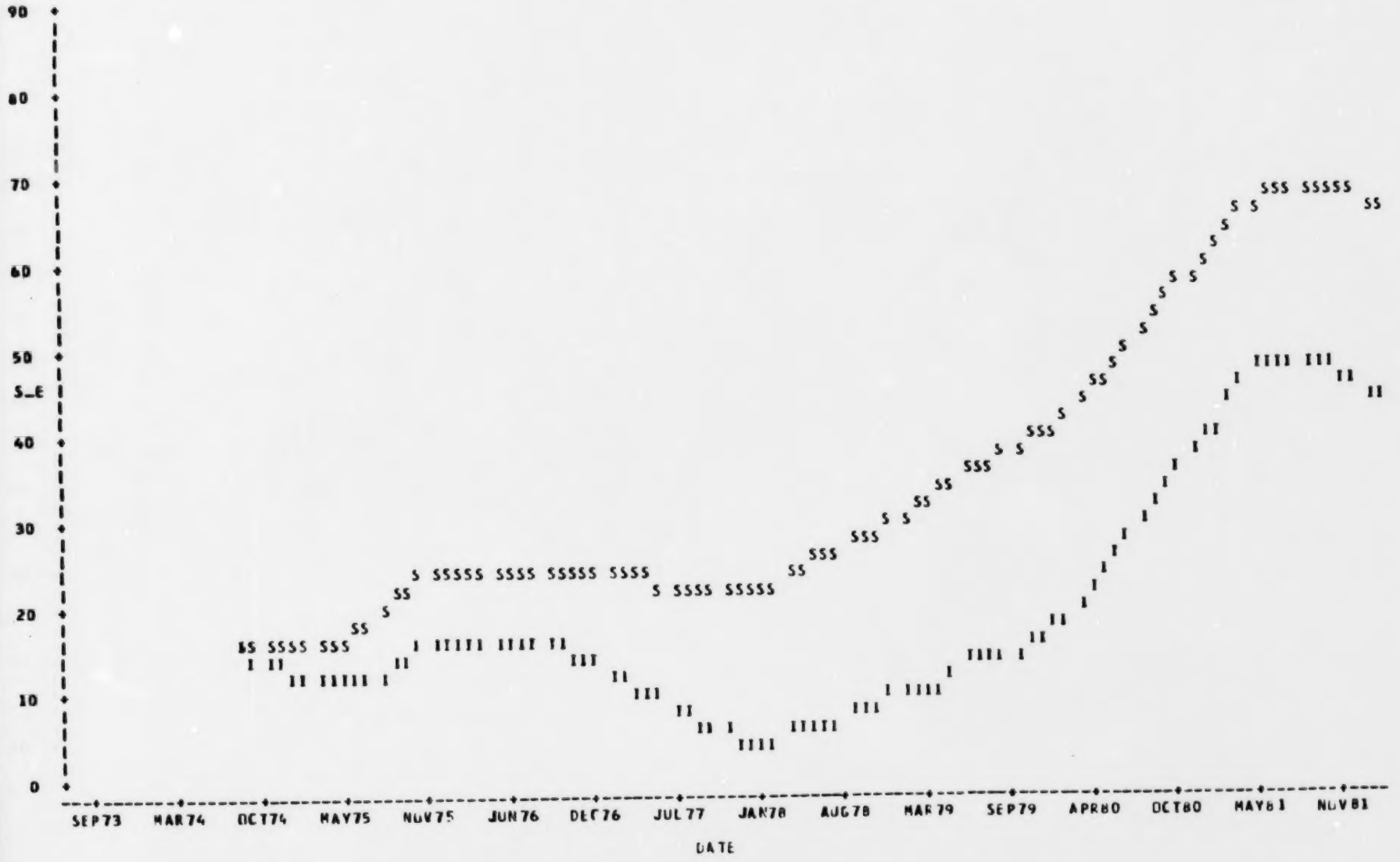


Chart 26 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I) Mortgage - Vancouver - House No. 2 - August 1974 - March 1982

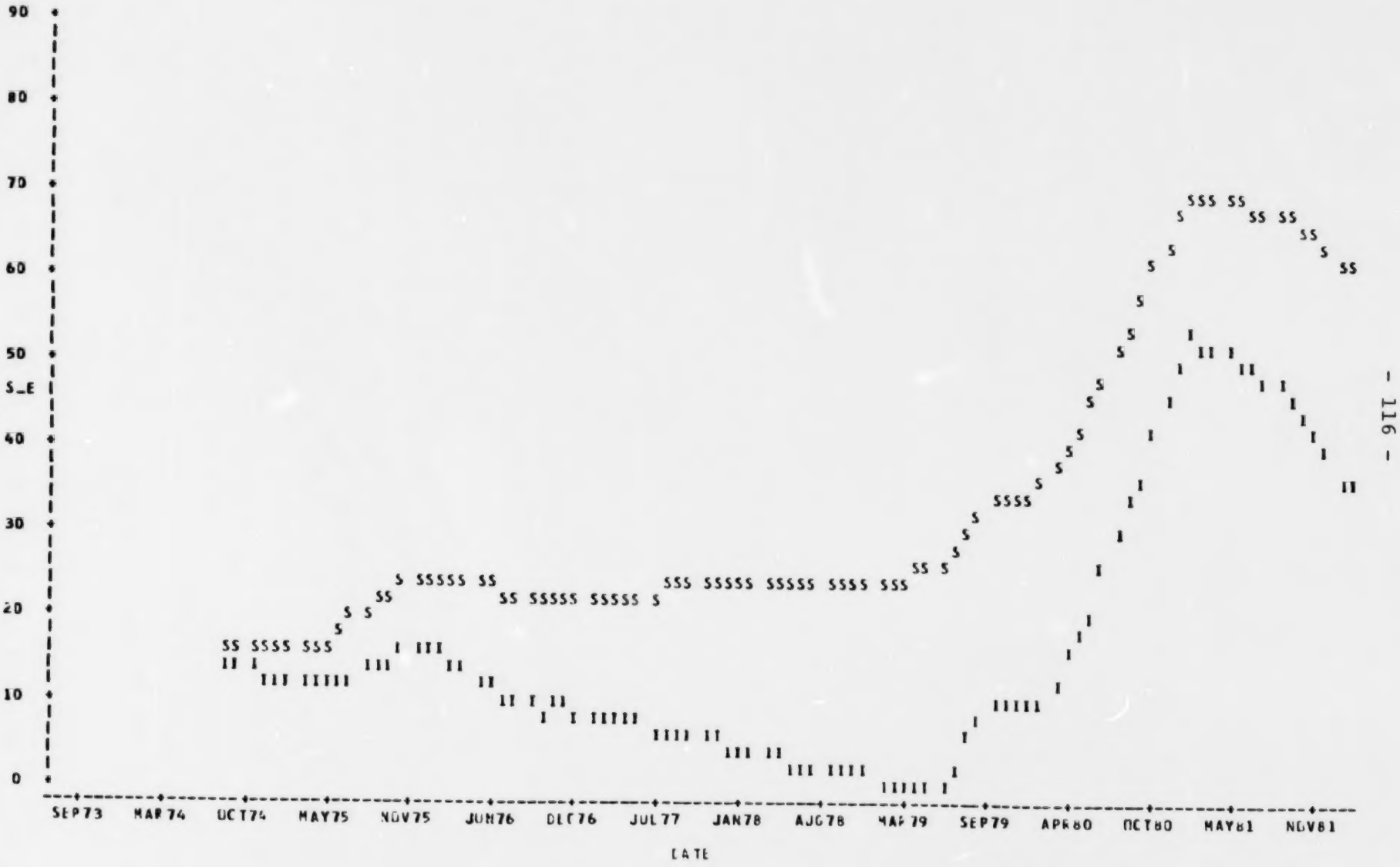


Chart 27 - Equity - Standard (S) 3-Year Term Versus CPI Indexed (I)
Mortgage - Halifax - House No. 2 - August 1974 - March 1982

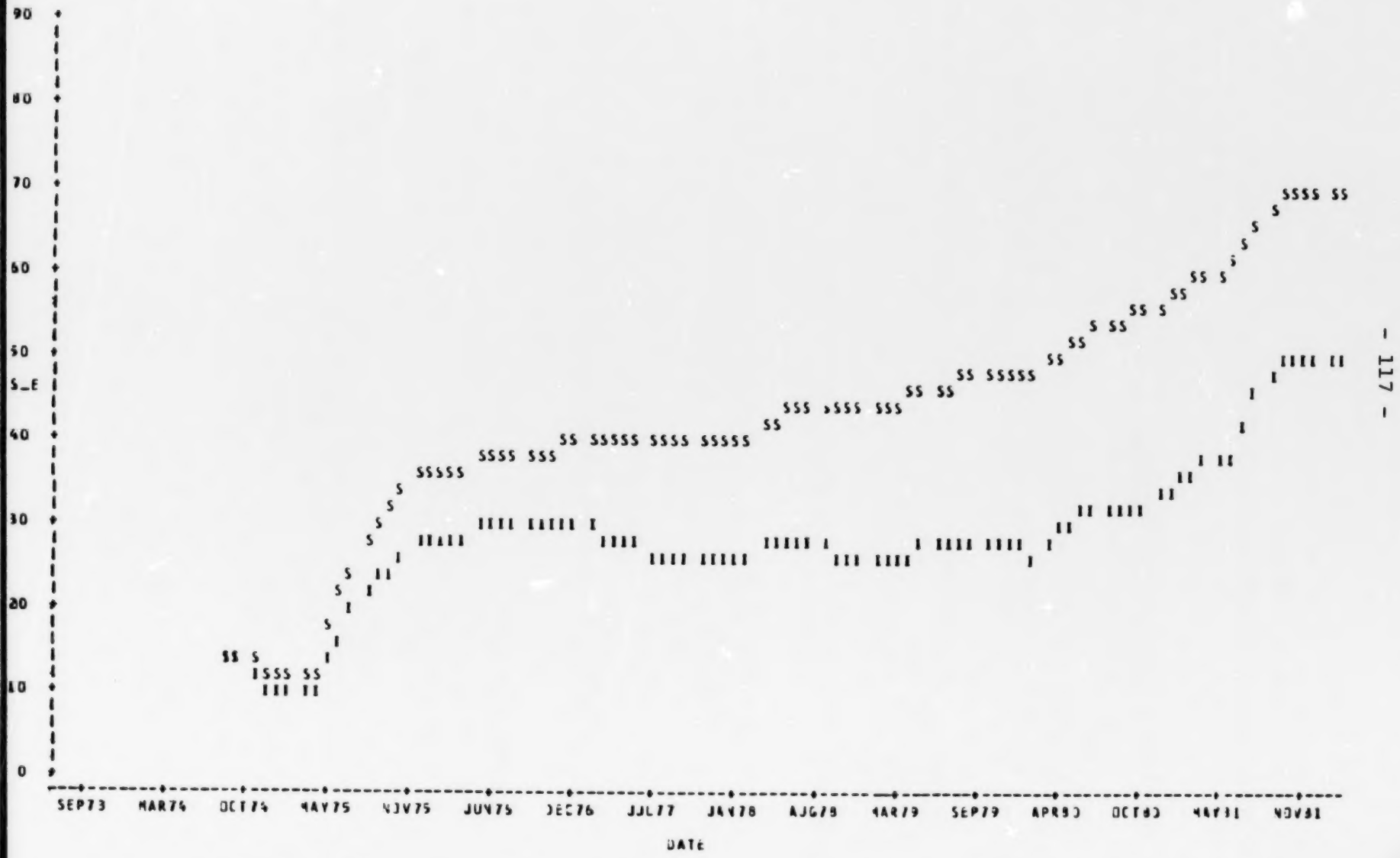


Chart 28 - Gross Debt Service ratios on a mortgage indexed to house prices (---), to CPI(—) and to wages (...) - Montreal - House No. 1

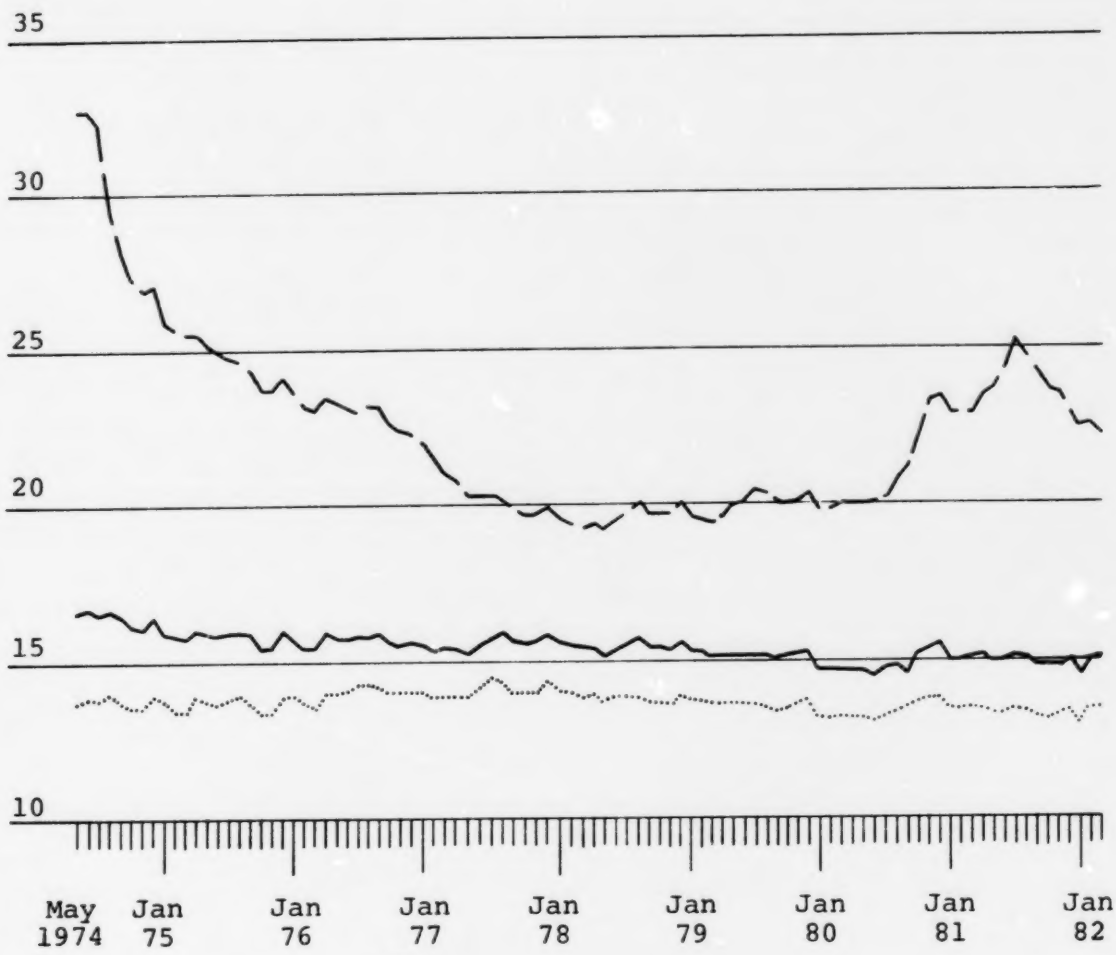


Chart 29 - Equity - Mortgage indexed to house prices (---), the CPI (——), and to wages (···) – Montreal - House No. 1

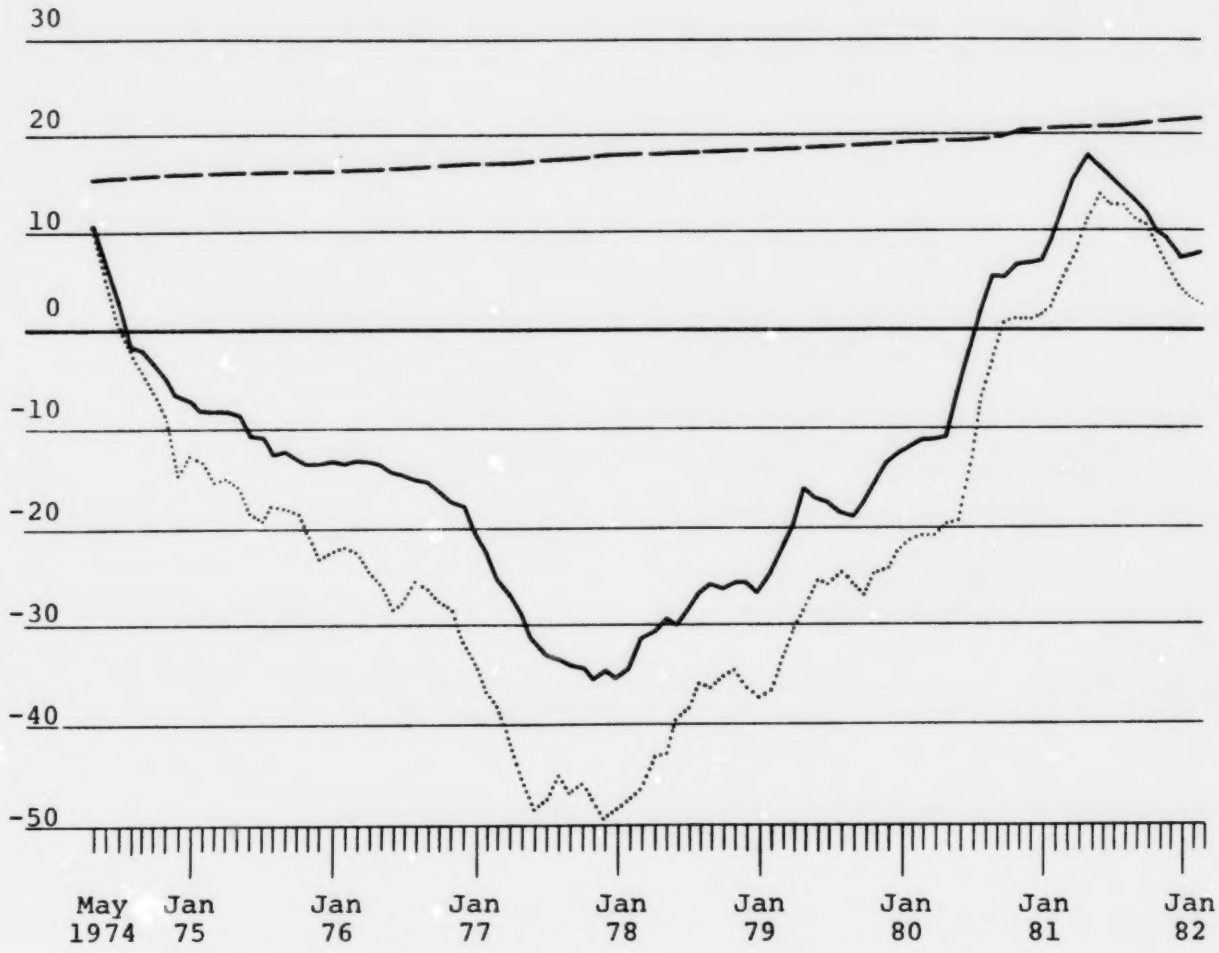


Chart 30 - GDS - Mortgage indexed to house prices (---), to the CPI (——) and to wages (...) - Halifax - House No. 1

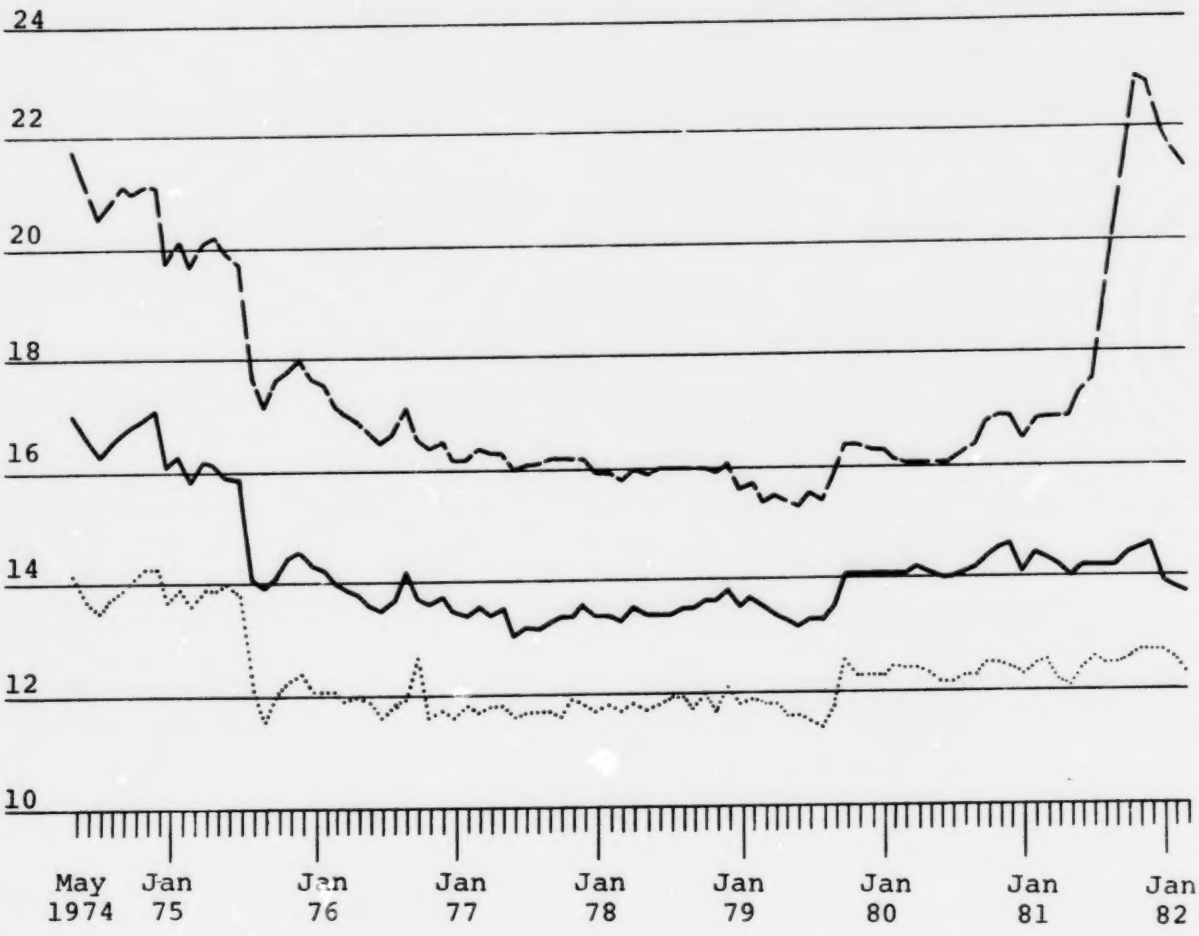


Chart 31 - Equity - Mortgage indexed to house prices (---), to the CPI (——) and to wages (...) - Halifax - House No. 1

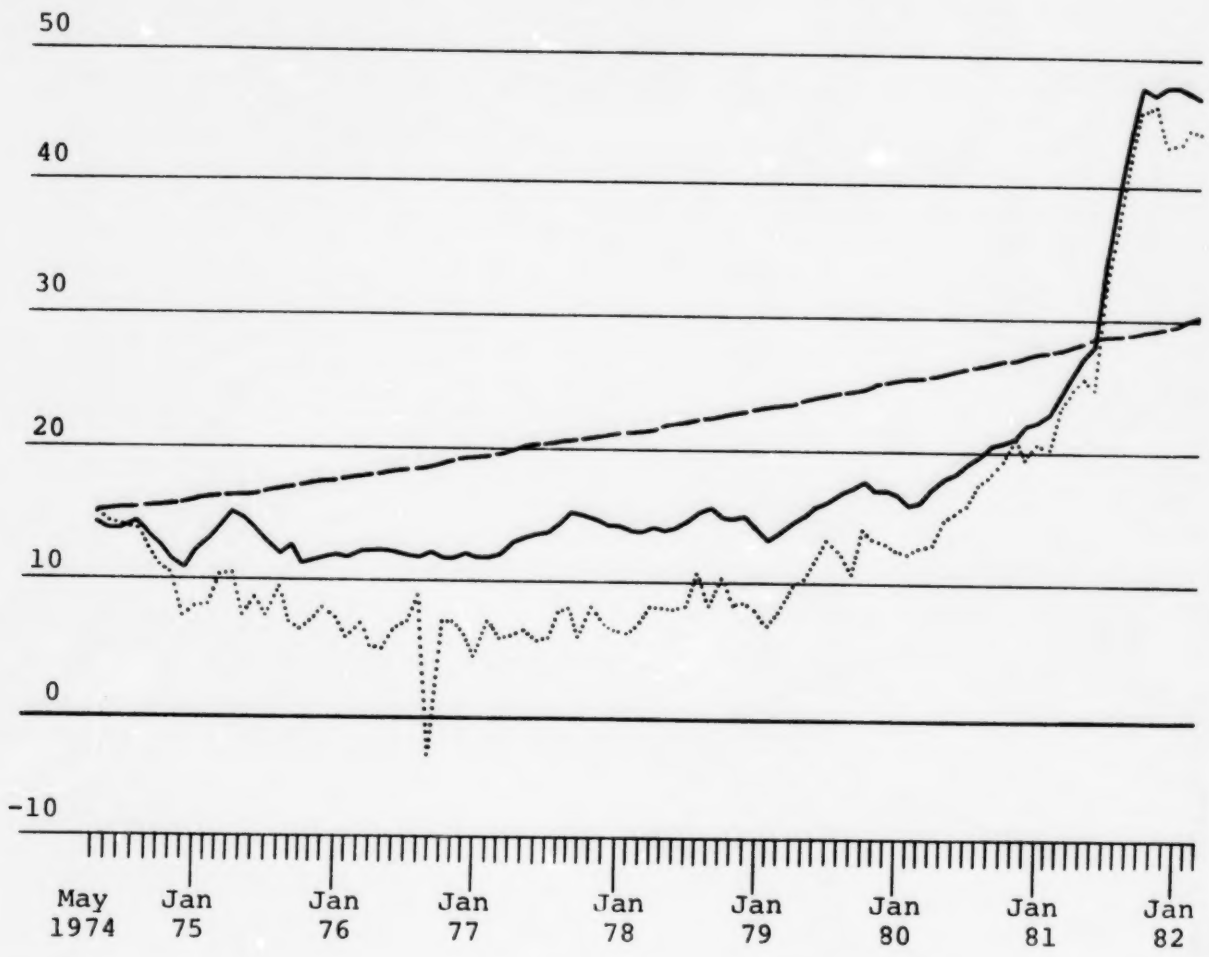


Chart 33 - GDS - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV Alberta Farm, 1961-1981

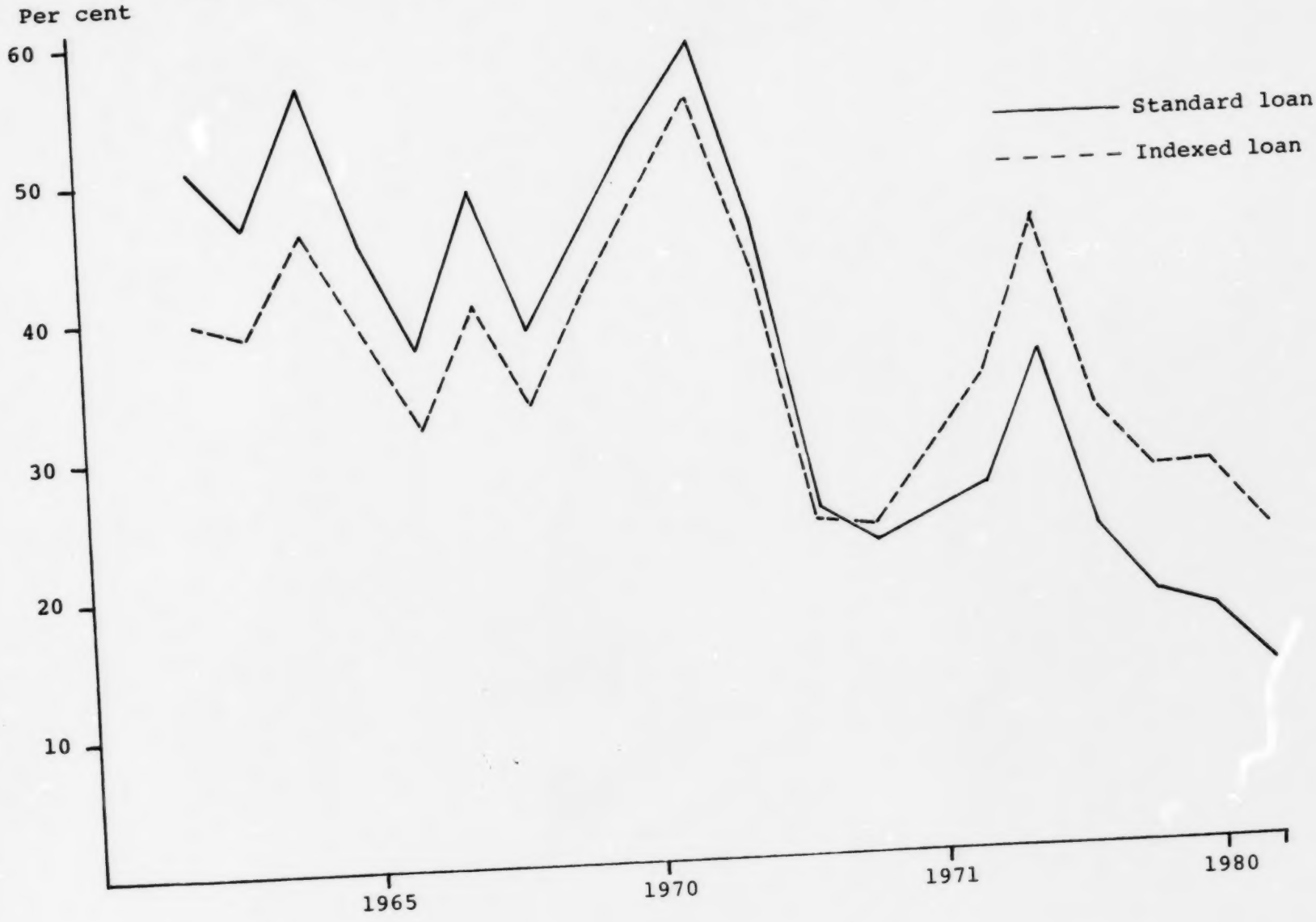


Chart 34 - GDS - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV Saskatchewan Farm, 1961-1981

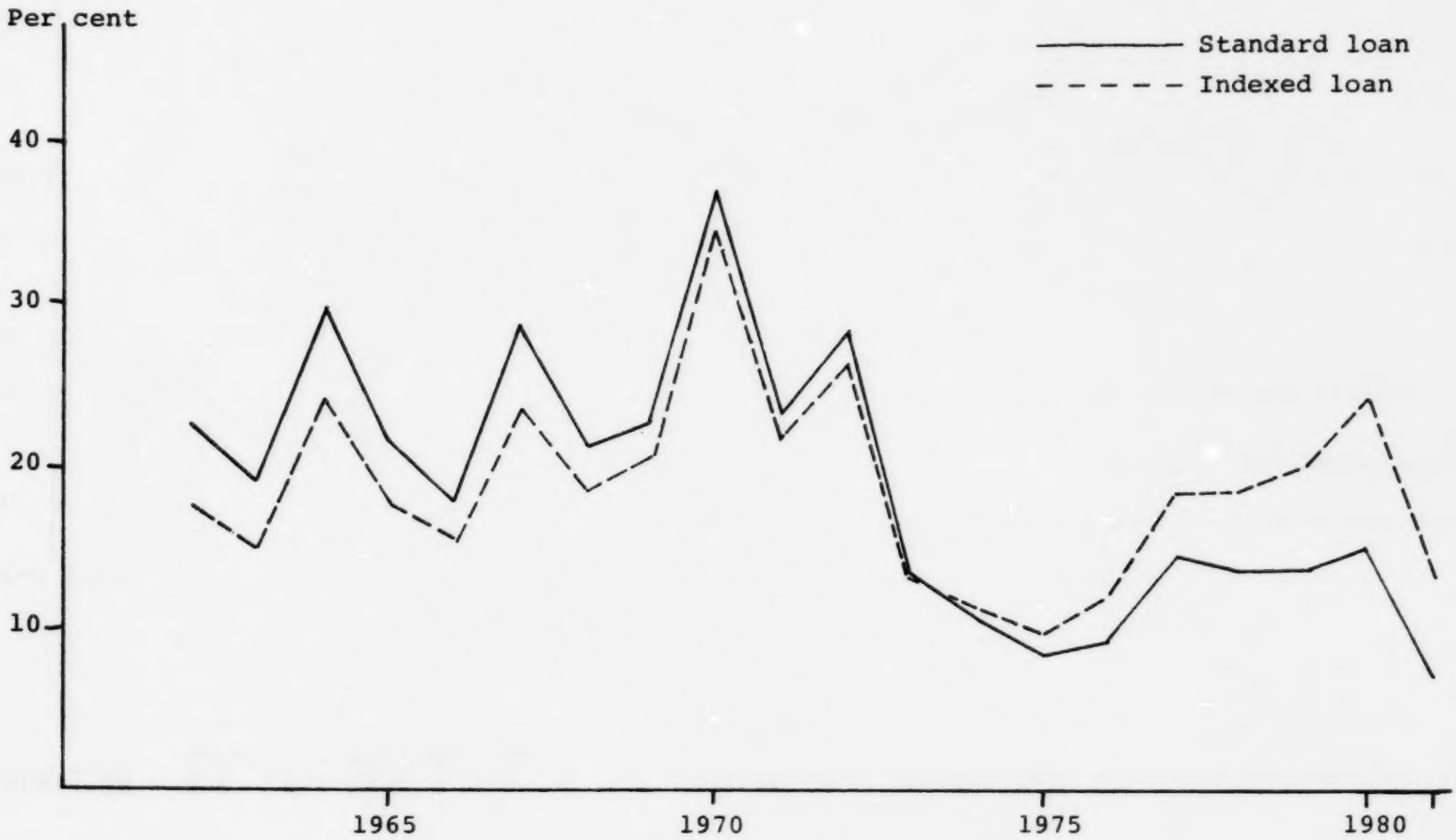


Chart 35 - GDS - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV
Ontario Farm, 1961-1981

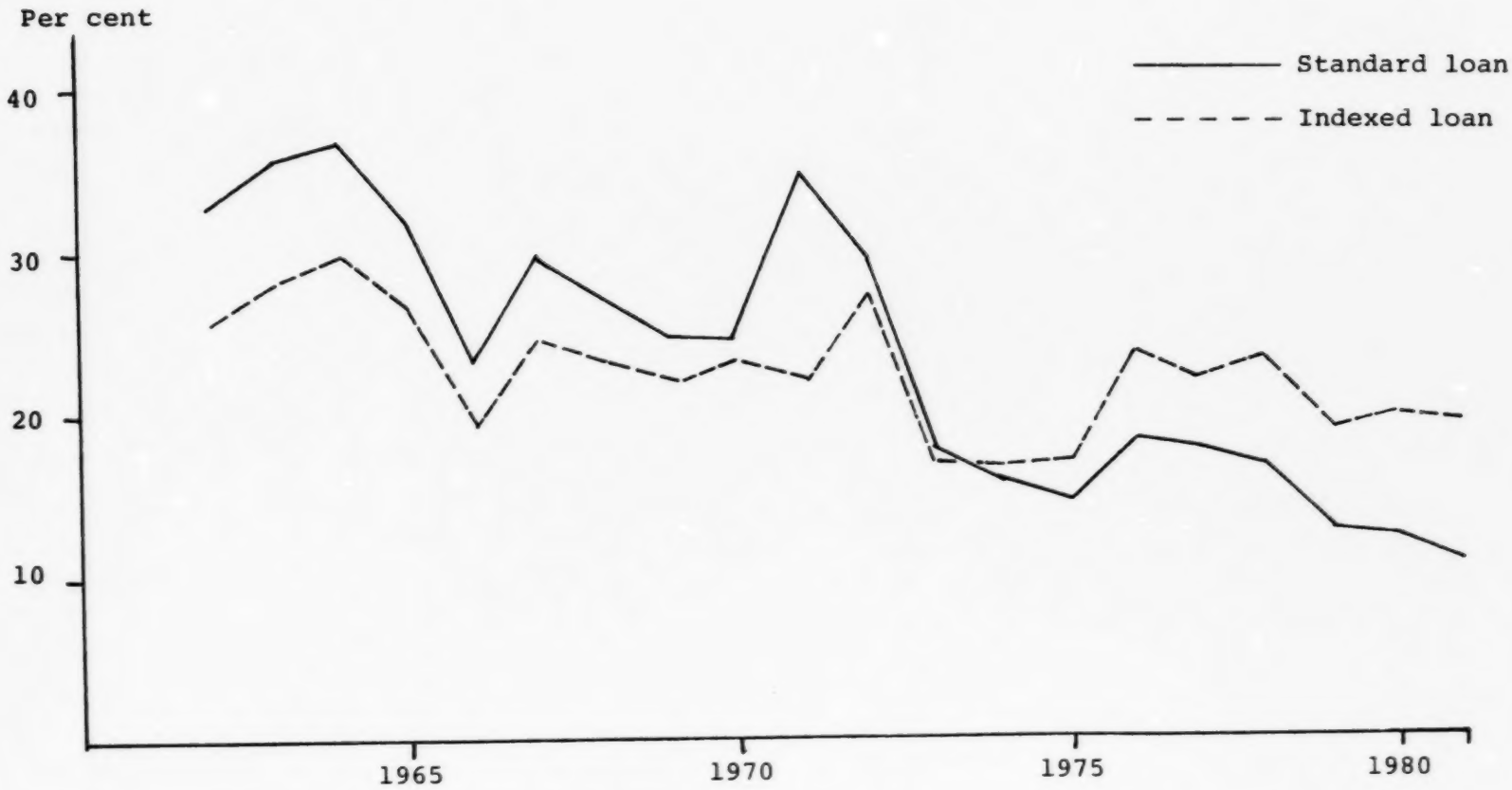


Chart 36 - Equity Ratio - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Alberta Farm, 1961-1981

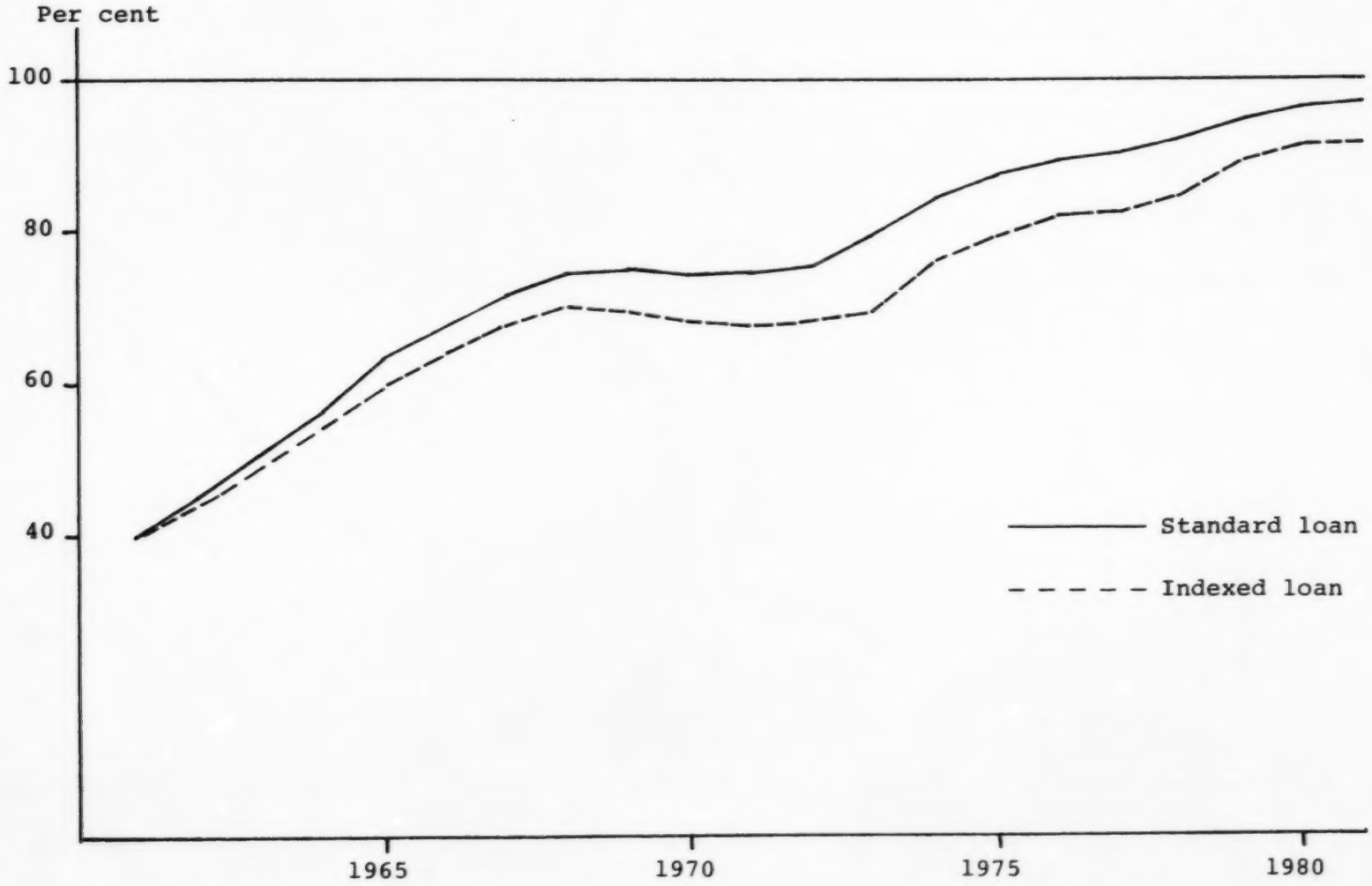


Chart 37 - Equity Ratio - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Saskatchewan Farm, 1961-1981

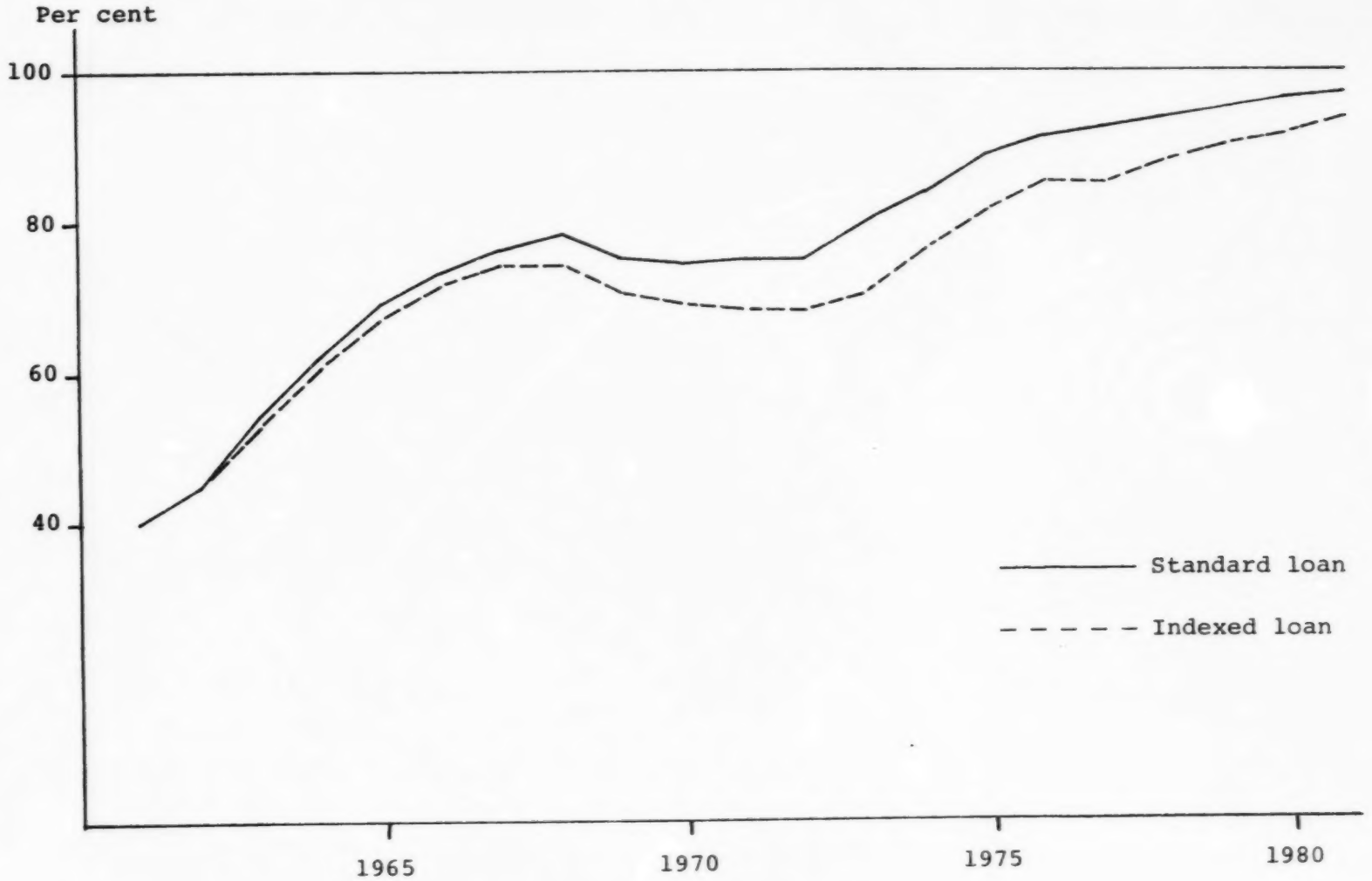
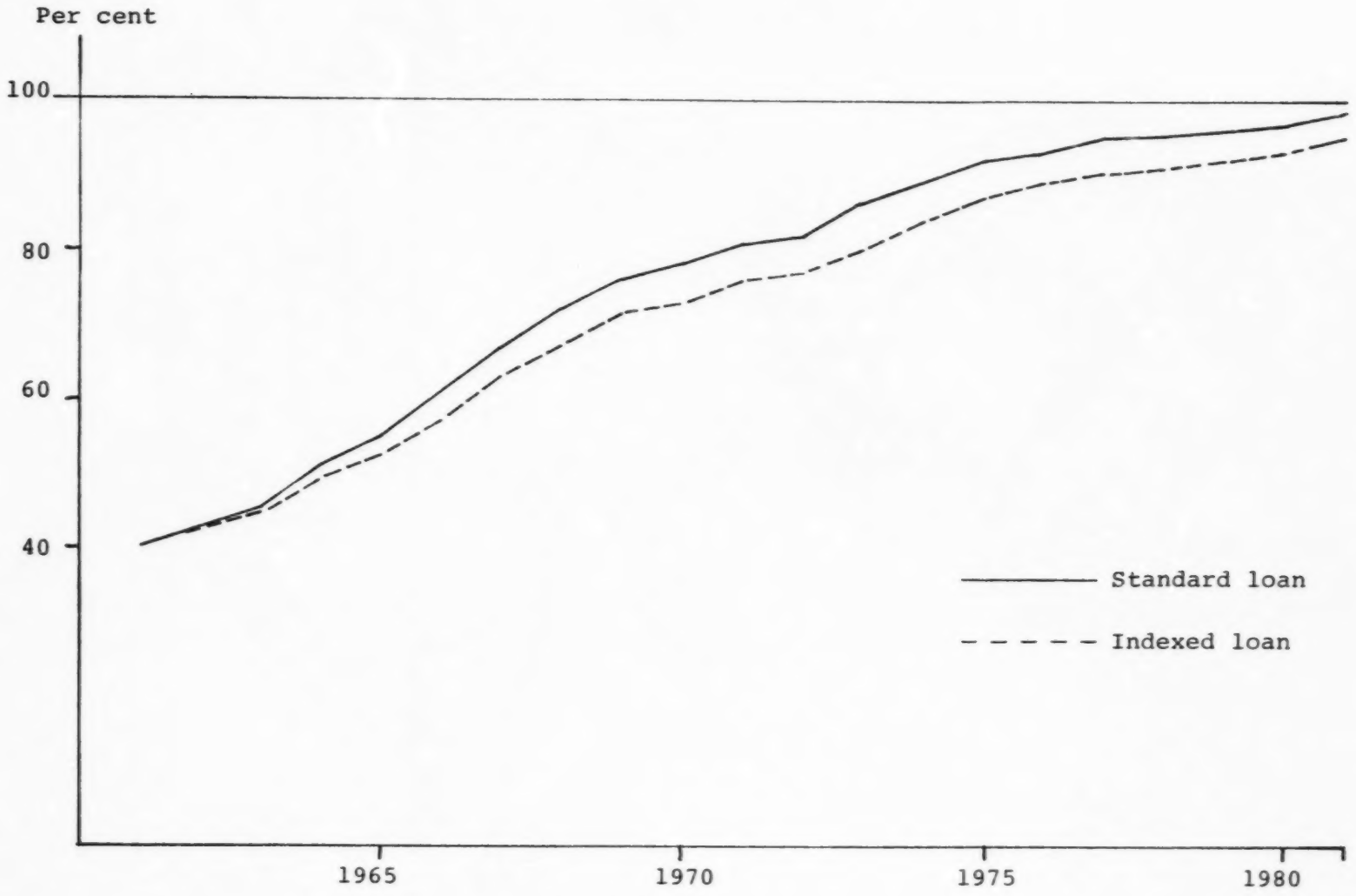


Chart 38 - Equity Ratio - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Ontario Farm, 1961-1981



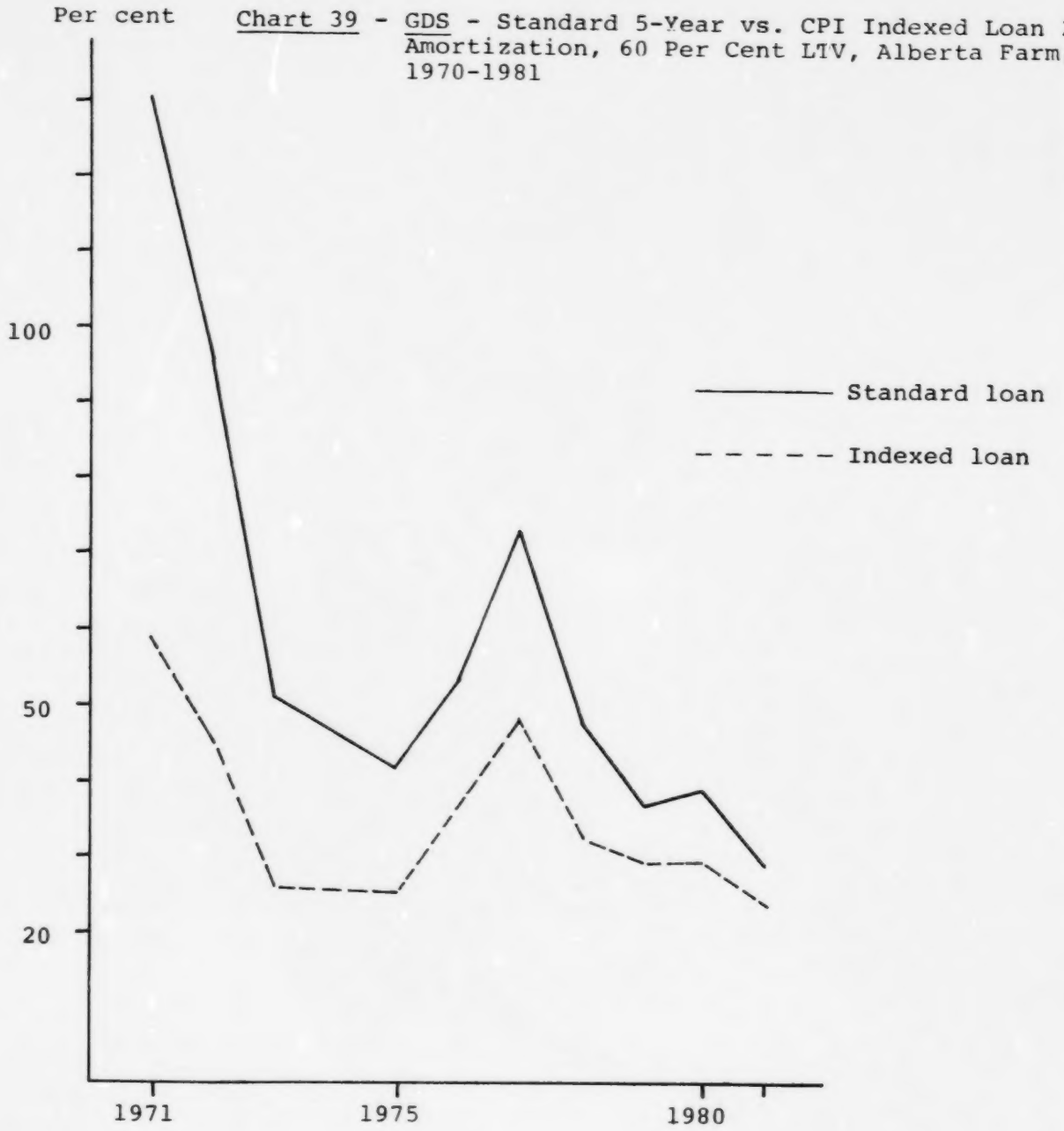


Chart 39 - GDS - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Alberta Farm, 1970-1981

Chart 40 - GDS - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Saskatchewan Farm, 1970-1981

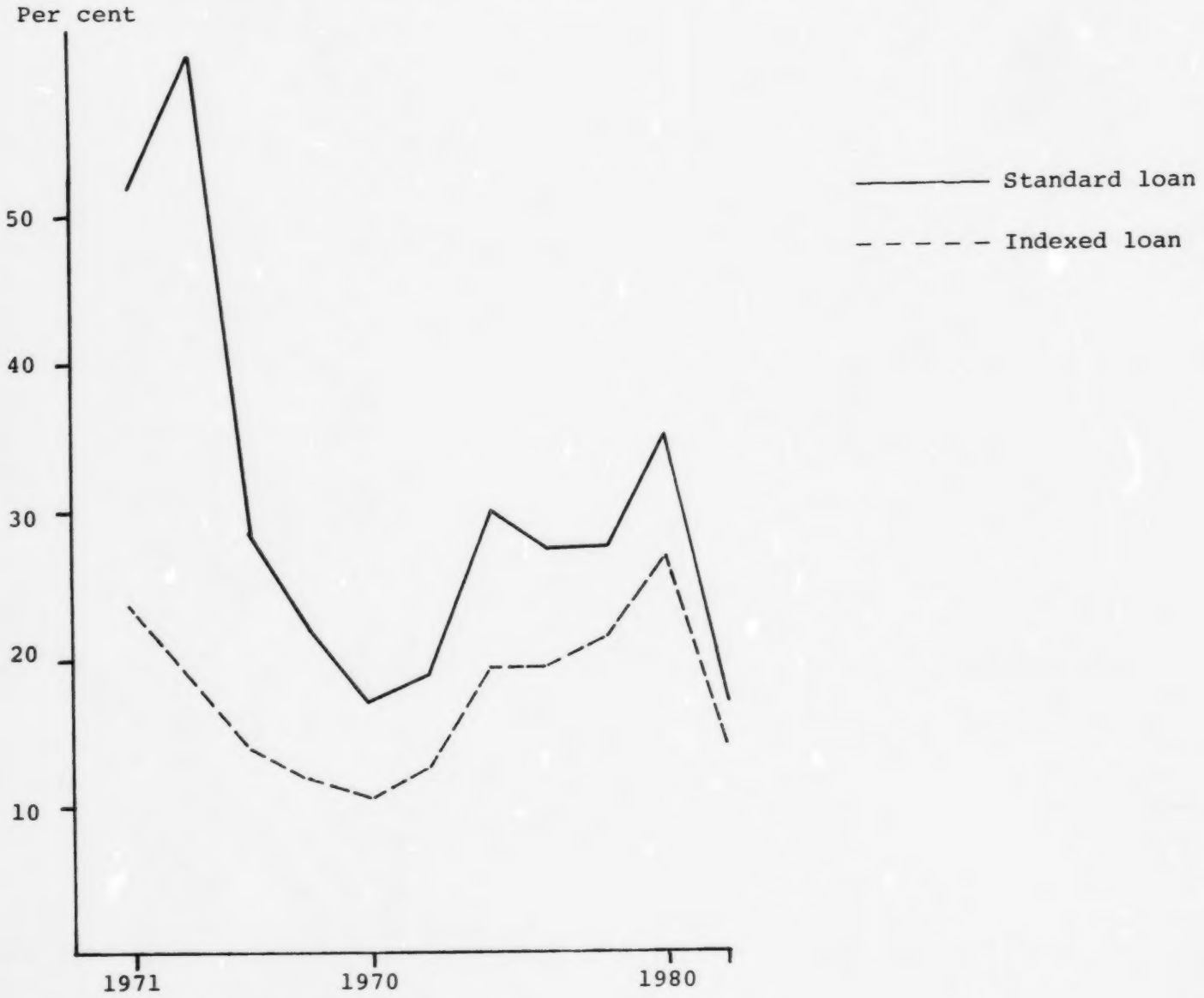


Chart 41 - GDS - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Ontario Farm, 1970-1981

Chart 42 - Equity Ratio - Standard 5-Year vs. CPI Indexed Loan
25-Year Amortization, 60 Per Cent LTV,
Alberta Farm, 1970-81

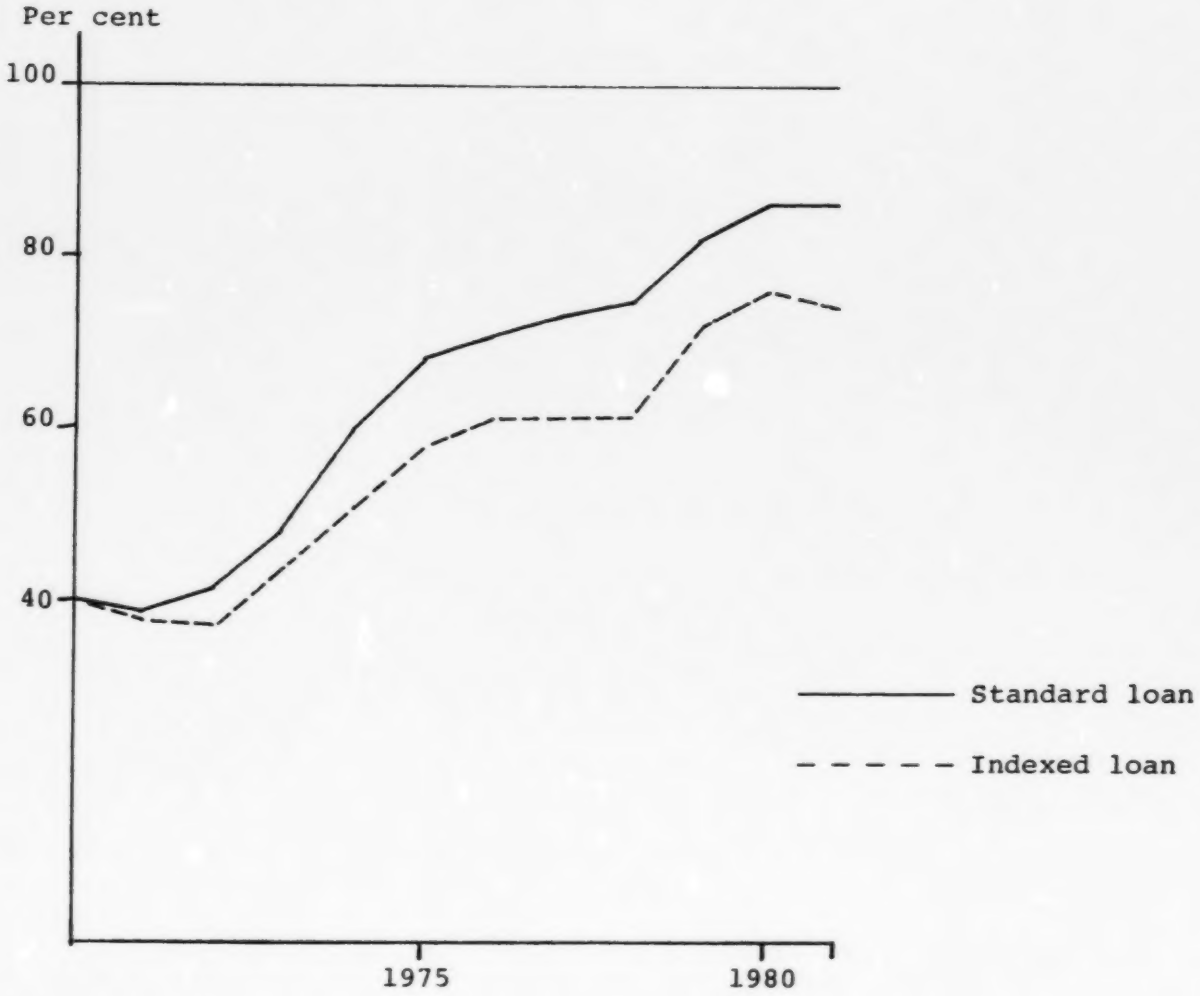


Chart 43 - Equity Ratio - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Saskatchewan Farm, 1970-1981

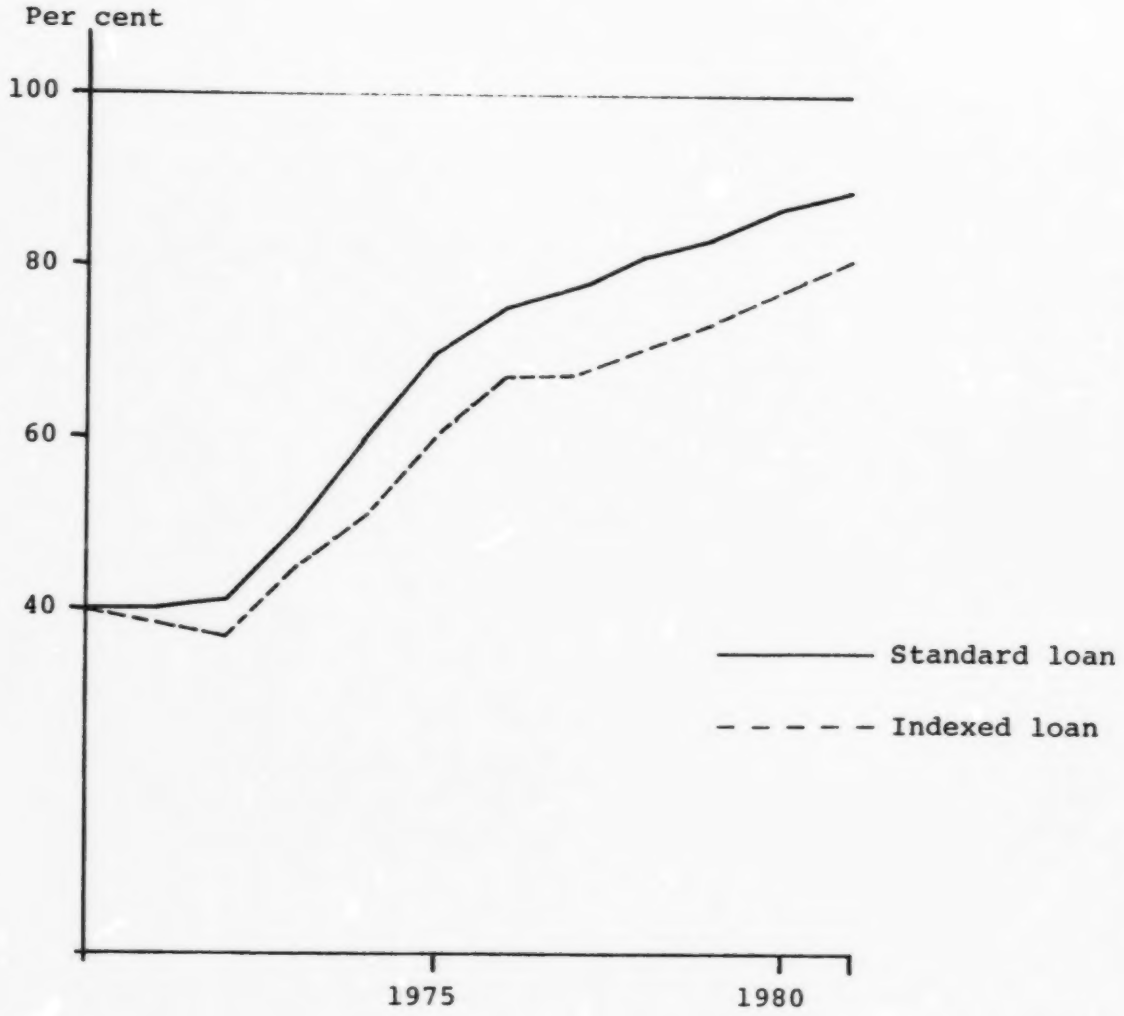


Chart 44 - Equity Ratio - Standard 5-Year vs. CPI Indexed Loan 25-Year Amortization, 60 Per Cent LTV, Ontario Farm, 1970-1981

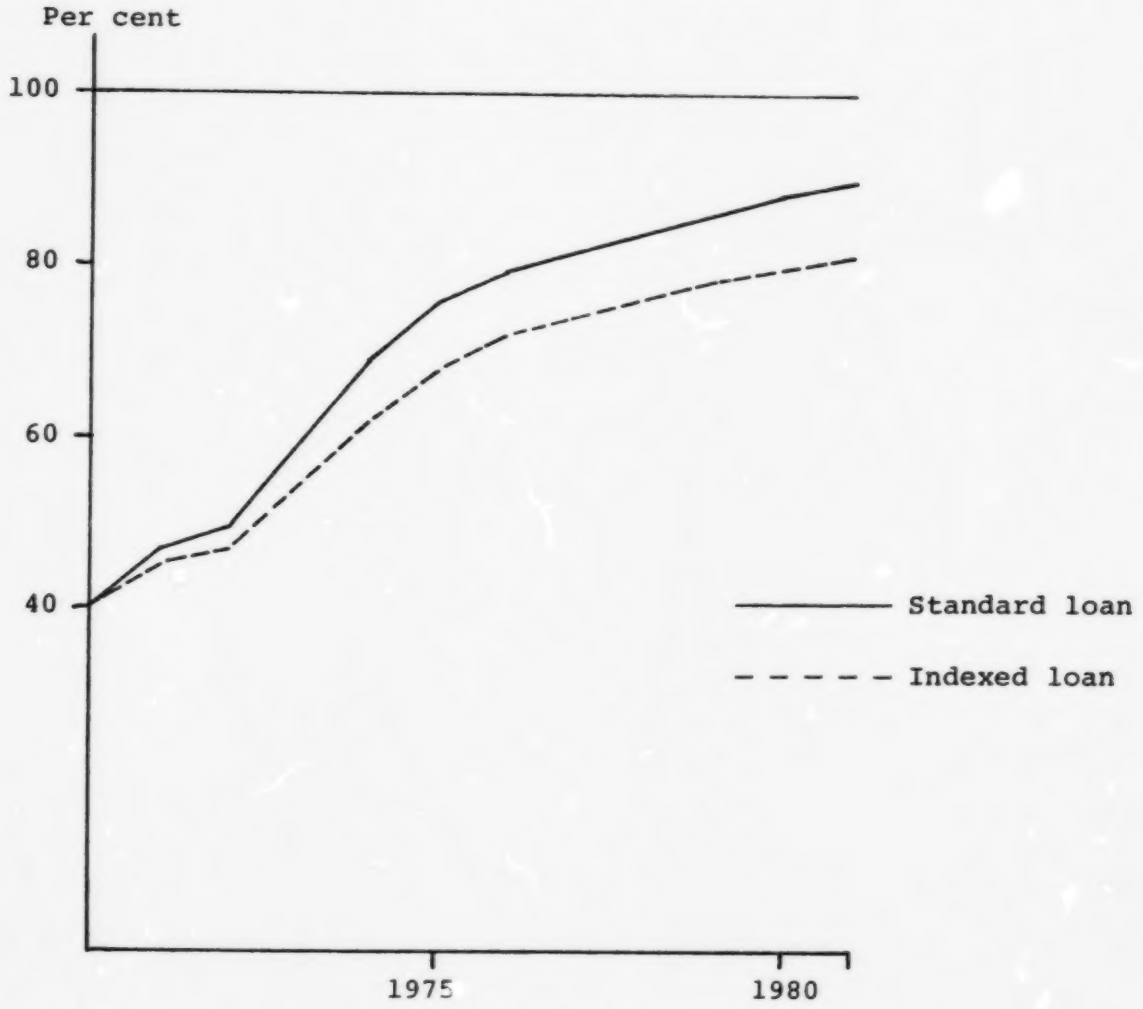


Chart 45 - GDS - Standard 5-Year vs. Land Price Indexed Loan 20-Year Amortization, 60 Per Cent LTV, Alberta Farm, 1961-1981

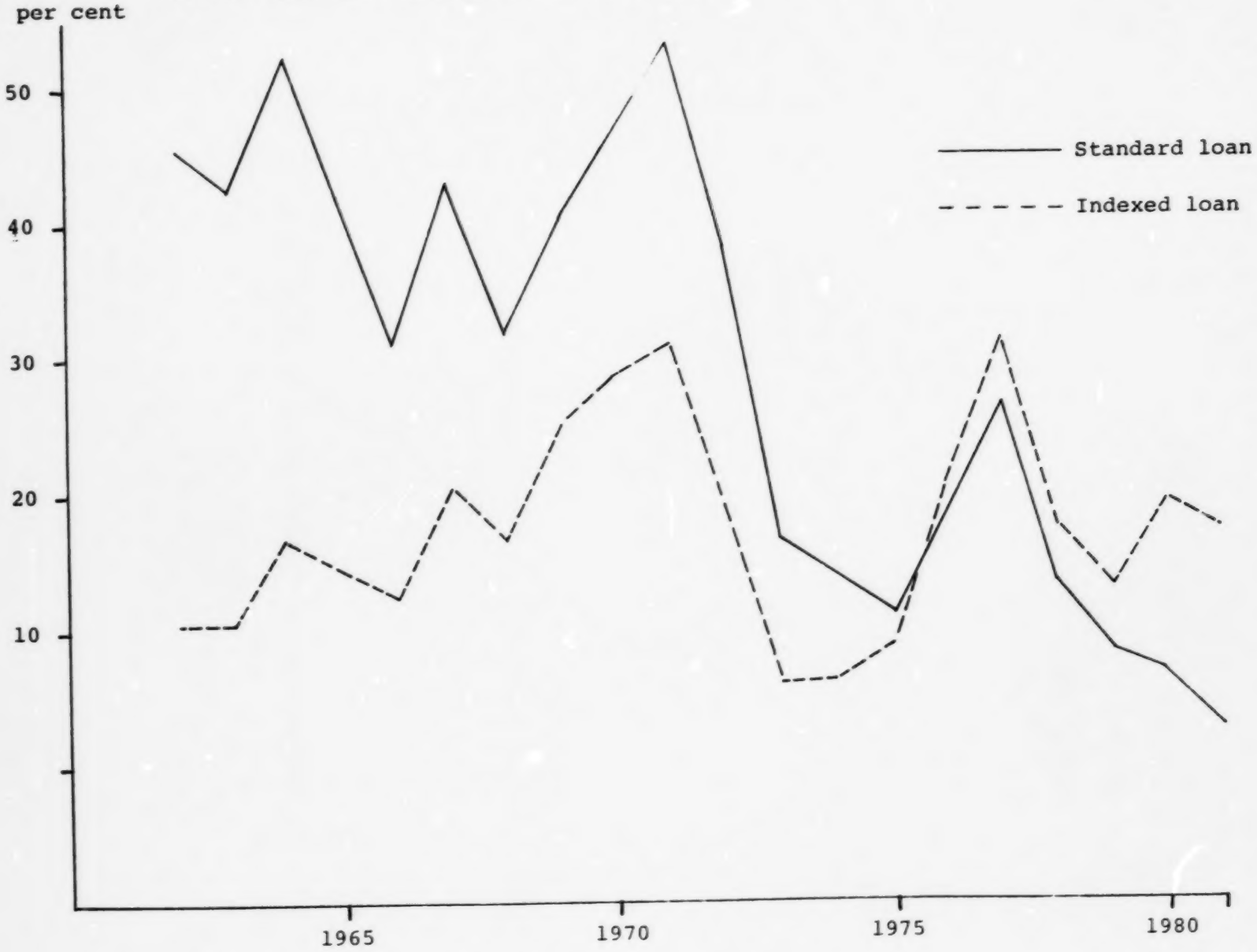


Chart 46 - GDS - Standard 5-Year vs. Land Price Indexed Loan 20-Year Amortization, 60 Per Cent LTV, Saskatchewan Farm, 1961-1981

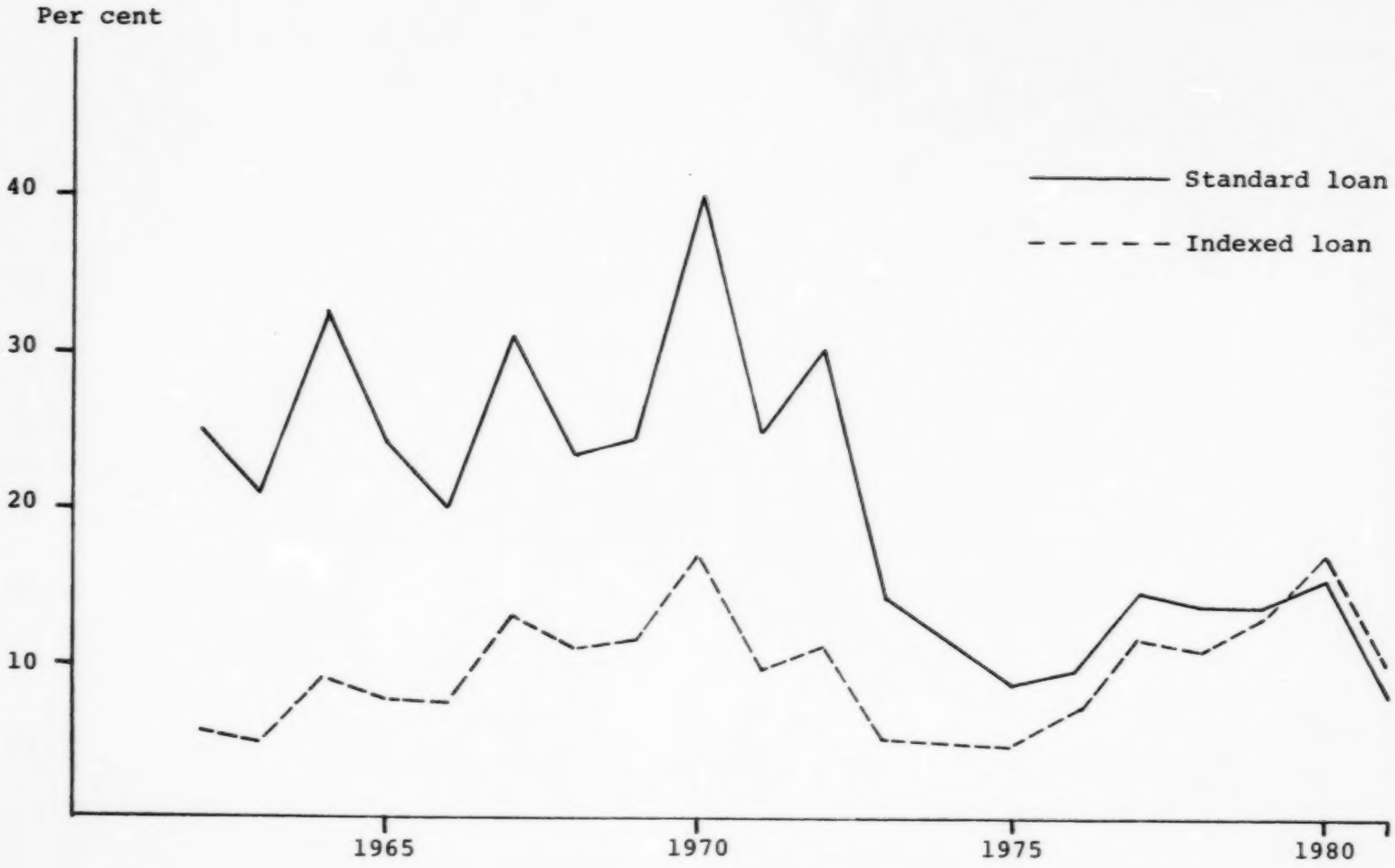


Chart 47 - GDS - Standard 5-Year vs. Land Price Indexed Loan 20-Year Amortization, 60 Per Cent LTV, Ontario Farm, 1961-1981

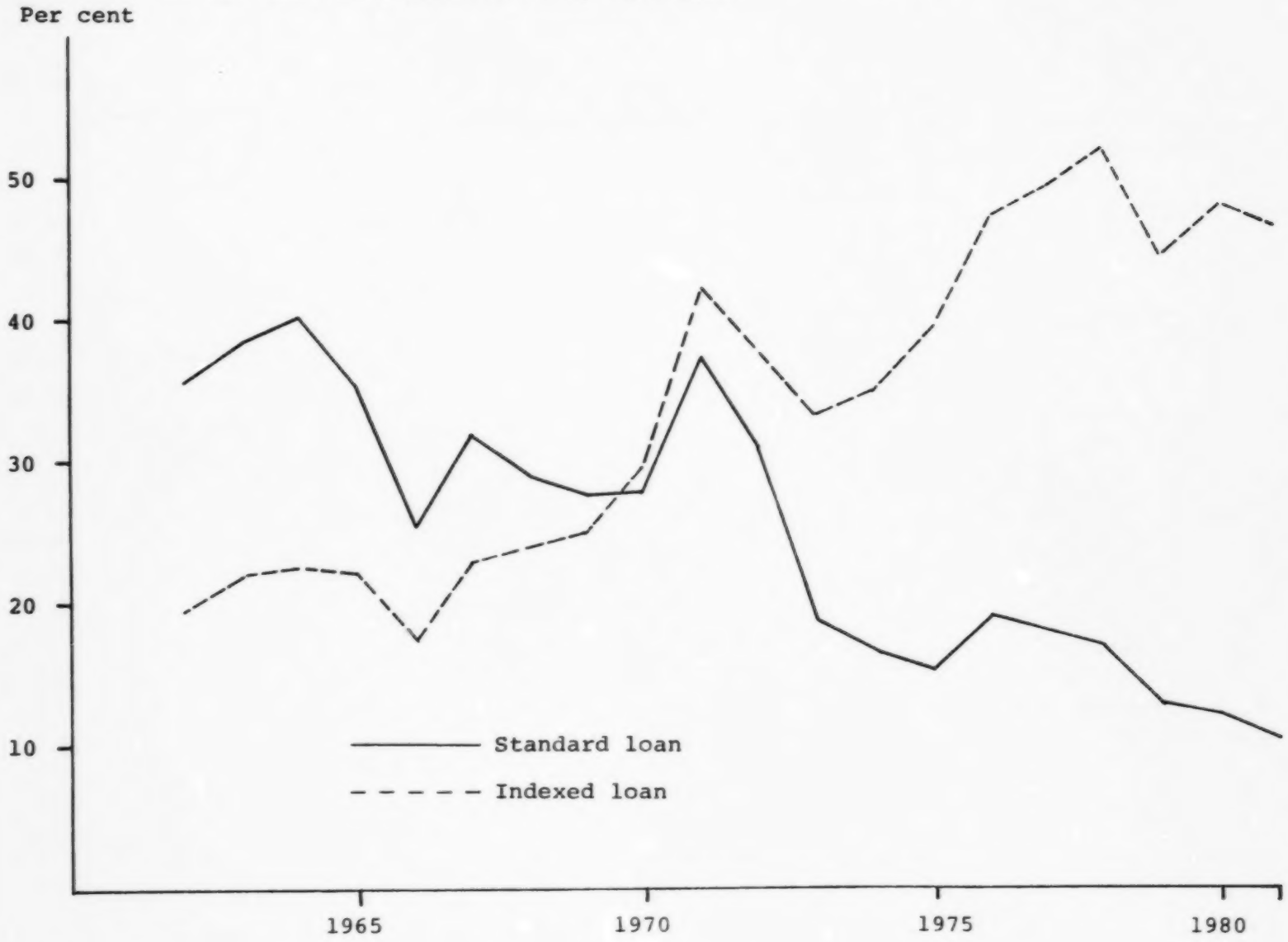


Chart 48 - Equity Ratio - Standard 5-Year vs. Land Price Indexed Loan 20-Year Amortization, 60 Per Cent LTV, Alberta Farm, 1961-1981

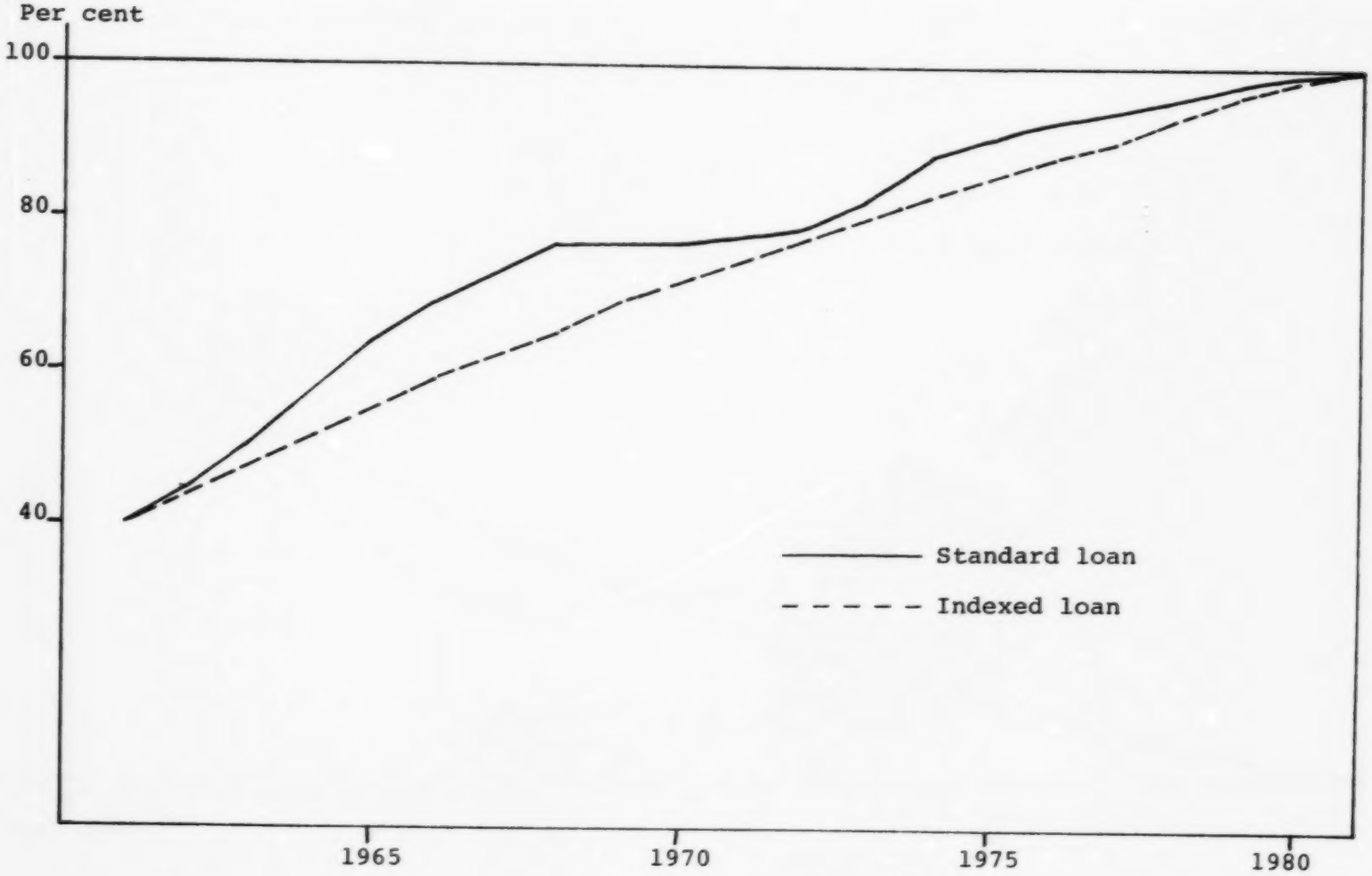


Chart 49 - Equity Ratio - Standard 5-Year vs. Land Price Indexed Loan 20-Year Amortization, 60 Per Cent LTV, Saskatchewan Farm, 1961-1981

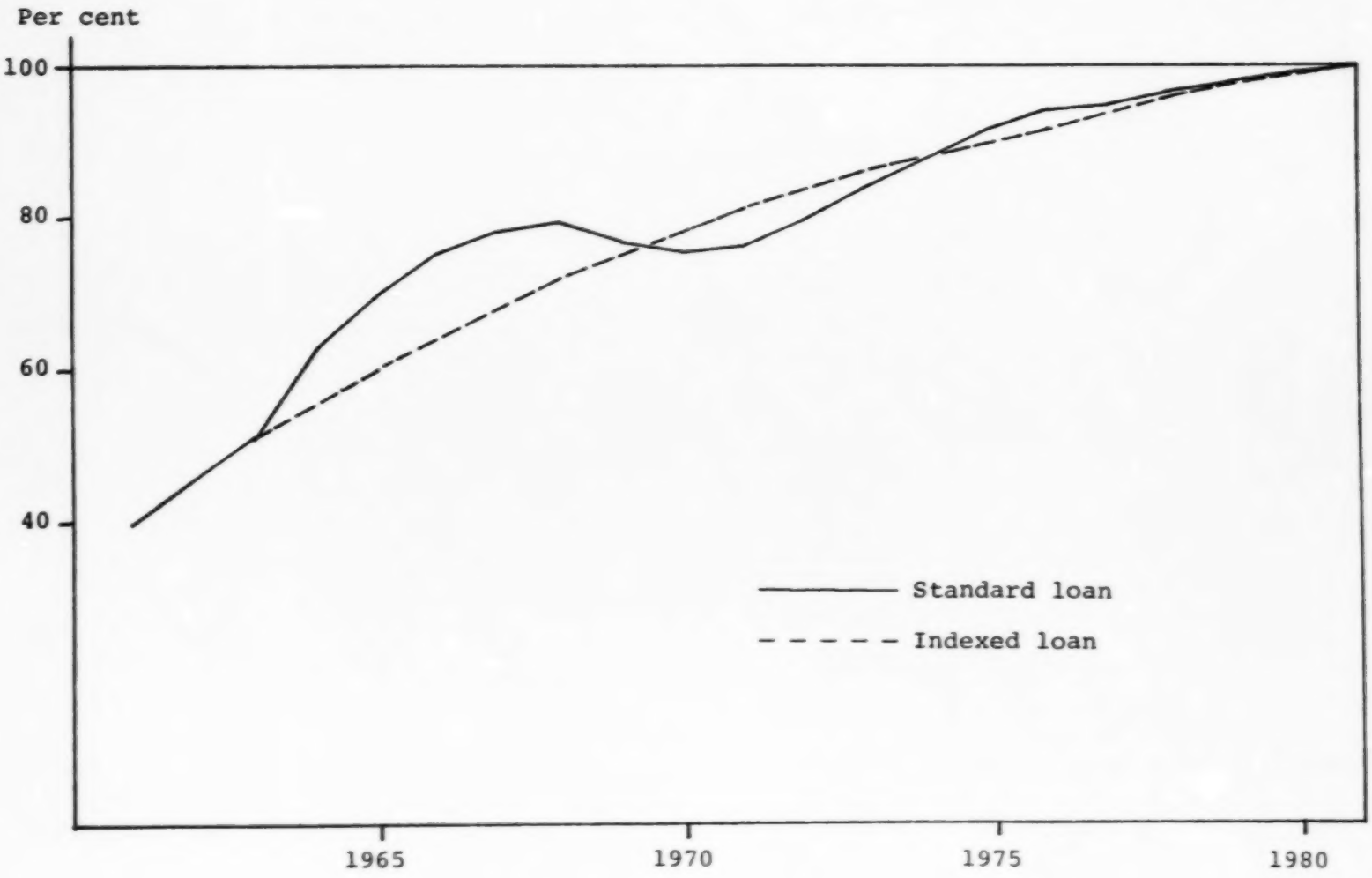


Chart 50 - Equity Ratio - Standard 5-Year vs. Land Price Indexed Loan 20-Year Amortization, 60 Per Cent LTV, Ontario Farm, 1961-1981